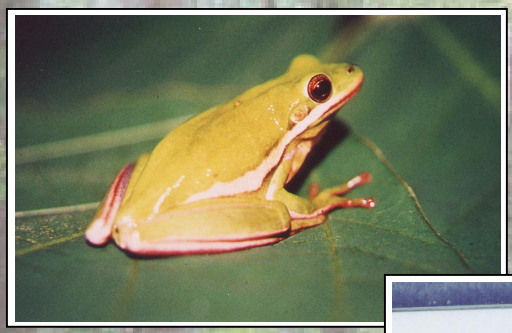
# APPENDIX P

# INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN ROBINS AFB, GEORGIA

# Integrated Natural Resources Management Plan

## Robins Air Force Base, Georgia





**September 2001**


Environmental Management Directorate
Environmental Resources Division
455 Byron Street, Suite 465
Robins AFB, Georgia 31098

# Integrated Natural Resources Management Plan

# Robins Air Force Base, Georgia

**September 2001**

**Prepared for:**

**Environmental Management Directorate**
**Environmental Resources Division**
**455 Byron Street, Suite 465**
**Robins AFB, Georgia 31098**

# Integrated Natural Resources Management Plan

# Robins Air Force Base, Georgia

This Integrated Natural Resources Management Plan has been developed by the Environmental Management Directorate, Robins AFB, Georgia, in cooperation with the United States Department of the Interior, Fish and Wildlife Service and the Georgia Department of Natural Resources.

**PLAN APPROVAL**

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13 Nov 01

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**AGENCY AGREEMENT**

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11/15/01

**Date**

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**Date** 10-11-01

***"Environmental Excellence Through Resolute Stewardship"***

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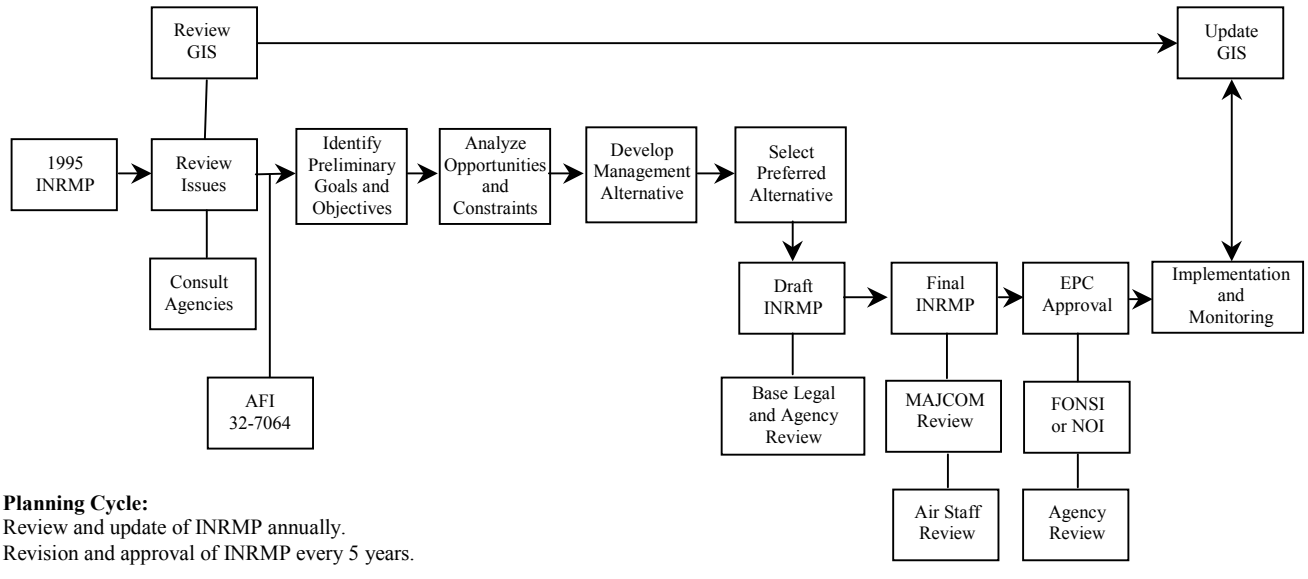
# General Information


The Integrated Natural Resources Management Plan (INRMP) is both a comprehensive guide to resource management and a "living document," subject to modification as new information and policies come to bear on it. Robins Air Force Base (AFB) personnel must take its goals and objectives into consideration when planning projects and mission changes. This plan will be implemented via the Robins AFB annual work plan process, which is envisioned as including appropriate integration of natural resources-related information from component programs and appropriate information from the environmental management website.

Individual work plans reflect the various component plans and determine how the natural resource management goals and objectives are to be achieved. The work plans supplement the INRMP and provide the implementation details for the various natural resource management initiatives.

The Robins AFB component programs provide individual component plans for the management of specific natural resources on the Base. These plans are incorporated by reference and will be available, along with this INRMP, on the environmental management website (www.em.robins.af.mil). The key component plans include: 1)*Threatened and Endangered Animal Species Survey*, March 2000, 2) *Rare Species and Natural Communities Survey*, 1994, 3) *Rare Plant Survey and Management Plan*, April 1999, 4) *Invasive Plants Management Plan*, September 1999, 5) *Tree Management Plan*, January 1995, 6) *Upland Forest Survey*, March 1998, 7) *Wetland Protection Plan*, July 1999, 8) *Robins AFB BASH Plan*, January 1999, 9) *A Critical Review of the Pesticide Reduction Program at Robins AFB, GA*, 1997, 10) *Outdoor Recreation Facility Mapping*, October 1998.




*Integrated Natural Resource Planning Process at Robins Air Force Base.*

# Management Philosophy

The INRMP is a tool to guide both short-term and long-range resource management activities integrated with the mission and the Base comprehensive planning process. The INRMP was developed using interdisciplinary input and is to be included in all planning activities at Robins AFB. It serves as a decision-making tool for commanders on environmental issues, and serves as the basis of natural resources management.

The INRMP is to be used with the comprehensive Robins AFB geographic information system (GIS) resource maps, which also include land classifications (see, for example, Appendix A). Keeping the GIS up to date with new resource information as it is developed will enhance the plan's effectiveness. Other organizations including the Civil Engineering Group (CEG) will be using the GIS, and its expansion will further enhance the planning for and management of natural resources at Robins AFB.

This INRMP, when approved by the Base's natural resources manager, the Environmental Protection Committee (EPC), and the Major Command (MAJCOM), will serve as the overall guide to management of natural resources. The natural resource manager has the principal role in carrying out the goals and objectives of the INRMP and will monitor all management strategies and adjust them as needed.

# Purpose and Use of Plan

This INRMP for Robins AFB, Georgia, clarifies, revises, and builds on the 1995 *Integrated Natural Resource Management Plan*, and further builds on the 1989 *Natural Resources Plan*. The 1995 and 1989 plans should be consulted for more detailed information regarding particular resources and ongoing management activities at the Base.

This INRMP incorporates the following:

- Many of the goals, objectives, and implementation measures in the 1989 and 1995 plans;
- Resources information from the Base's GIS on natural resources planning and management; and
- Consolidation of natural resource planning information into one overall document.

The INRMP is based on an interdisciplinary approach to the conservation and ecosystem management of natural resources on Robins AFB. The plan is site-specific in cases where management actions are to occur in specific areas and sets forth overarching management goals, practices, and guidelines that address similar areas Basewide. In accordance with the Sikes Act (USC Title 16, Chapter 5C, Subchapter I, Conservation Programs on Military Installations), this INRMP is the primary driver for enforcement of natural resources laws and regulations.

# Authority

The INRMP adheres to the guidelines set forth in Air Force Instruction (AFI) 32-7064, *Integrated Natural Resources Management*. AFI 32-7064 explains how to manage natural resources on Air Force (AF) property in compliance with federal, state, and local standards and implements the following: Air Force Policy Directive (AFPD) 32-70, *Environmental Quality*; Department of Defense Directive (DODD) 4700.4, *Natural Resources Management Program* (24 January 1989); DOD 7000.14-R, Volume IIA, *Reimbursable Operations Policy and Procedures* (September 1997) and Department of Defense Instruction (DODI) 4715.3 *Environmental Conservation Program* (3 May 1996). DODI 4715.3 implements policy, assigns responsibilities, and prescribes procedures for the integrated management of natural resources. AFI 32-7065, *Cultural Resources Management,* sets guidelines for protecting and managing cultural resources. Applicable laws, regulations and other directives that guide integrated natural resource management at Robins AFB are listed in Appendix B.

# Plan Structure

This document presents background information first, including management philosophy, plan purpose and authority, use, plan structure, installation history and military mission and impacts, the physical setting,

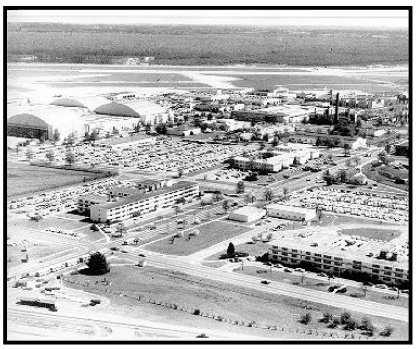
and a summary of natural resources including fish and wildlife, plants, water, land, people, and program management. The second section summarizes primary management goals, resource management issues, and management objectives. The last section summarizes management implementation. Terms are defined following the text references. Resource maps, plant and animal species lists and policy letters are provided in Appendices A, C, and D, respectively.

## Installation Location


Robins AFB is located approximately 15 miles south of Macon, Georgia, and 90 miles southeast of Atlanta. It is located in Houston County, adjacent to the eastern city limits of the town of Warner Robins. Its western boundary runs parallel and adjacent to Georgia State Highway 247.

## Installation History

The forerunner of Robins AFB was the Wellston Air Depot, which was activated at the small town of Wellston, population 50. Early in 1941, Macon civic leaders, with the help of Congressman Carl Vinson, persuaded the Army Air Corps to establish a maintenance and supply depot in adjoining Houston County 18 miles south of Macon. The city of Macon and Bibb County purchased 3,000 acres with $100,000 from bonds, and donated the land to the federal government. In 1941 the area around the original tract of 3,108.5 acres established for the Army Air Corps Depot was primarily undeveloped. The Base was established on land that had few agricultural attributes, much of which was covered by wetlands. All of the upland soils were disturbed, and portions of the wetlands were filled to establish a level land area to construct the buildings and runways needed to conduct the mission of the Army Air Corps.



Construction was completed on March 14, 1942, and Wellston Depot was officially activated. Through its history the Base and its Commands have had a series of names, all reflecting its logistical mission: Wellston Army Air Depot, Warner Robins Air Depot Control Air Command, Warner Robins Air Technical Service Command, Warner Robins Air Material Area. On April 1, 1974, the Base was named Warner Robins Air Logistics Center, WR-ALC.

The four decades following World War II were years of challenge and tremendous growth for Robins Air Force Base. The world had entered an era of uneasy peace broken by conflicts that required more and more logistics support. The changing requirements of a jet age Air Force added a new dimension to the challenge, leading to the growth of the Commands and the Base. Today the Warner Robins ALC and Robins AFB is the state's largest industrial facility employing over 4,000 military and over 13,000 civilian employees. Robins is home to over 40 organizations including the Warner Robins ALC, Headquarters Air Force Reserve (HQ AFRES), the 19th Air Refueling Wing (19ARW) or "Black Knights," 5th Combat Communications Group (5CCG), 93rd Air Control Wing (93 ACW) (Joint STARS), and the 116th Bomb Wing (116BW) of the Air National Guard (B-1B).

# Military Mission and Impacts

The basic mission of WR-ALC has not changed since its beginnings in 1941. The primary task of the Center is to maintain Air Force aircraft and their components. The methods of meeting this responsibility have changed only in the equipment itself and the complexity of the workload. Under the guidance of WR-ALC, the Center carries out repair, maintenance, supply, and other related logistics functions. Further discussion regarding the Base, major units, and major tenant missions may be integrated from the Robins website (www.robins.af.mil).

Because a large proportion of the Robins AFB area is undeveloped, part of the planning for current and future missions involves grouping related functions together and separating incompatible ones. Another part is maintaining, preserving, and enhancing both the human environment and the natural resources. The Environmental Management Directorate (EM) charged with the latter goal, is responsible for preparation of this INRMP. Its mission is to restore, protect, and foster respect for the environment to ensure the continued mission of Robins AFB.

The primary impacts on natural resources are those related to:

- Past land management practices
- Current operation and maintenance of grounds and facilities
- Construction of new facilities to accommodate mission changes.

Past solid waste and other management practices involving hazardous materials have resulted in sites that are presently undergoing study and remediation under the Installation Restoration Program (IRP) to identify and reduce potential impacts to natural resources. Intensive ground training activities and aircraft operations (including BASH control) are the current mission activities with the greatest potential to impact natural resources. New facility construction to support future mission changes will require the development of additional land with associated effects on the natural environment.

The natural resources manager reviews proposed projects as appropriate under National Environmental Policy Act Compliance (AFI 32-7061) and the Environmental Impact Analysis Process (AFI 32-202).

# Geography and Topography

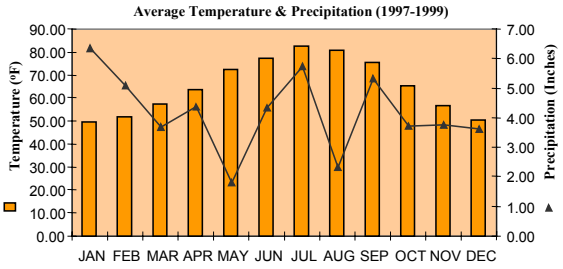
Robins AFB lies along the upper margin of the Coastal Plain 20 miles southeast of the Fall Line, which separates the more resistant crystalline rocks of the Piedmont from the less resistant unconsolidated deposits of the Coastal Plain. The Base is located on the low alluvial terrace of the Ocmulgee River. The Base slopes generally eastward, between elevations of about 300 feet mean sea level (msl) on the west and 240 feet msl on the east. Much of the area bordering the eastern side of the Base is low-lying swampland, and parts of the Base have been constructed over filled wetlands. Robins AFB lies within the Upper Coastal Plain near the borders of the Piedmont and Lower Coastal Plain physiographic provinces (Appendix A, Figure 1). This positioning affords a mixture of lower piedmont, upper coastal plain, sandhill, and lower coastal plain habitats. Information regarding the Base and surrounding communities, as well as nearby natural areas, may be integrated from the EM website (www.em.robins.af.mil).

# Climate

The climate of Robins AFB is influenced by the Gulf of Mexico and the Atlantic Ocean, and by the Appalachian Mountains to the northwest. Warm moist air masses originating from the Gulf and the Atlantic Ocean cause high precipitation in the area and high humidity year-round. The weather is warm and humid during most of the summer.

Temperatures of 90° F or higher can be expected on 3 out of 4 days in June, July, and August, and temperatures of 100° F or higher occur an average of 5 to 7 days each summer. The winters are generally

mild; daily low temperatures of 32° F or below occur on average about 35 days each winter, in several short periods mostly from December through February. The average growing season is about 250




days. Average yearly rainfall near the Base is between 35 and 45 inches. March and July are normally the wettest months, each averaging more than 5 inches. Fall is the driest part of the year, but no month has an average of less than 2 inches. Occasionally, there are tornadoes, and some of the more severe local thunderstorms are accompanied by damaging winds. The average relative humidity ranges from 80 to 90 percent in the morning and from 43 to 63 percent early in the afternoon.

# Geology

Geologic units ranging from Cretaceous to Quaternary, typically unconsolidated, have been described in the Warner Robins area. Older Cretaceous units are encountered to depths of approximately 1,700 feet, underlain by crystalline basement rocks (Appendix A, Figure 2). Geologic units consist of Cretaceous Ripley and Providence Sand, Eocene Undifferentiated Sands, and Quaternary Alluvium. Most of the site is immediately underlain by alluvial deposits of the Ocmulgee River. The depth to consolidated deposits is presumed to be at least 1,700 feet. The western half of the Base is sandy alluvial deposits; the eastern part is underlain by peat and fine-grained organic silt deposits.

The groundwater hydrology of the Warner Robins area has been reported by LeGrand (1962) and by the Georgia Geologic Survey (Sonderegger et al. 1978; Thomson et al. 1956). Groundwater is found beneath Robins AFB under both water table and artesian conditions. The water table is present throughout the Base at shallow depth in the upper sandy alluvial deposits. The water table discharges to the east and contributes to the development of a swampy area extending to the Ocmulgee River. There appears to be a confining bed just below the swamp deposits, which would create weak artesian conditions immediately below this upper layer. Both the land surface and the confining beds are inclined towards the southeast, but the inclination of the beds is steeper. Further discussion regarding the general physical environment may be integrated from the EM website (www.em.robins.af.mil).

# Soils

Sixteen soil units and nine complexes are mapped on Robins AFB. The soils at Robins AFB were mapped in 1987, and a soil survey was conducted by the NRCS in 1989. Information on specific management practices for soils mapped on the Base and limitations and potentials of each soil can be found in the NRCS Soil Survey. In general, all undeveloped soil types on Robins AFB, including both wetland and upland soils, are suitable for wildlife food plants and protective cover vegetation (Appendix A, Figure 3). Additionally, soils at Robins AFB are not very erodible.

# Fish and Wildlife

Horse Creek and Sandy Run Creek, tributaries of the Ocmulgee River, provide most of the stream habitat at Robins AFB. Horse Creek is a small bottomland stream draining marshland in the northeastern portion of the Base. Sandy Run Creek, a significantly larger drainage, marks the southern boundary of the Base.

These streams provide habitat for fish, reptiles, and amphibians and for many species of aquatic invertebrates. Fishes likely to utilize stream habitat at

Robins AFB include lamprey, minnow, sucker, catfish, madtom, killifish, bass, sunfish and darter (Appendix C). Both aquatic stream habitat and stream banks and margin areas are used by aquatic and semi-aquatic turtles, including the common snapping turtle, loggerhead musk turtle, eastern mud turtle, and yellowbelly slider. Also utilizing this habitat are semi-aquatic snakes, including the eastern cottonmouth and banded water snake.

Stream habitat at Robins AFB also is used by mammals, such as muskrat and beaver, and by birds, (mostly waterfowl). Horse Creek, Sandy Run Creek, and the Ocumulgee River provide valuable floodplain habitat which, when flooded, provides ideal foraging and rearing habitat for many fish species. Temporary ponds located on the floodplain margins provide habitat for frogs, toads, and salamanders to breed and raise their young.

The highest diversity of animals on Robins AFB occurs in the southern and eastern sections, in undeveloped bottomland and transitional forest associated with the floodplains of Sandy Run and Horse Creeks and the Ocmulgee River. In these relatively undisturbed areas, a mosaic of numerous hydric and semi-hydric communities provides over 2,000 acres of excellent wildlife habitat for mammals, birds, reptiles, amphibians, as well as invertebrates. Much of the wildlife inhabiting these highly productive ecosystems lives on the Base year-round. In addition, there are approximately 300 acres of upland forest consisting of mixed hardwood-pine-forests and loblolly pine plantations that provide additional wildlife habitat. Plant and animal species recorded during wildlife surveys by the NRCS in 1989 and GA DNR in 1993-1994 are listed in Appendix C. A more thorough discussion of biological diversity is provided in the "Plants" section of this INRMP.

Three biological surveys for federal and state endangered, threatened, or rare animal species have been conducted on Robins AFB (NRCS 1989, GA DNR during 1993 and 1994, and Earth Tech 2000). No federal or state endangered or threatened animal species were found on the Base, except for the American alligator which is listed because of similarity of appearance to the American crocodile. Bald eagles have been observed flying over the airfield.

# Plants

Robins AFB is located partly on a terrace and partly on bottomland of the Ocmulgee River. Upland pine forests, upland hardwood forests, and alluvial wetlands define the coastal plain ecosystem near the Base.

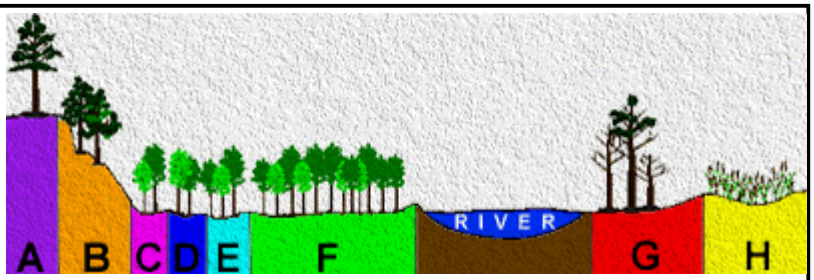
Upland pine forests dominated by trees such as longleaf pine (*Pinus palustris*) and loblolly pine (*P. taeda*) occupy elevated areas of the coastal plain on coarse-textured soils. Upland hardwood forests dominate some coastal plain sites, particularly on fertile soils without periodic fires. Dominant trees include southern magnolia (*Magnolia grandiflora*), American beech (*Fagus grandiflora*), various species of oaks, sweetgum (*Liquidambar styraciflua*), and loblolly pine.

The existing natural vegetation on Robins AFB may be divided into three general associations or cover types (Appendix A, Figure 4): (1) upland forest, (2) bottomland forest, and (3) transitional forest. Bottomland forest is the largest vegetation cover type on Base lands, occupying a total of 2,238 acres in 10 delineated areas, mostly in the southern and eastern sections of the Base (Appendix A, Figure 5). Upland forest amounts to 291 acres in 7 areas, primarily in the southeastern section of the Base. A detailed description of the bottomland forests, upland forests, transitional forests, and urban, timbered, and planted pine cover types is included in the 1995 INRMP (Section 5.2). In addition to the natural cover types,

*Rare Plant Species found at Robins AFB. "Clockwise from right: Ocumulgee skullcap, Oval ladies-tresses, Awned meadowbeauty"*

artificial vegetation cover types have been mapped and include planted pine, timbered areas, turf grass and golf course, and general field areas. Non-natural cover types (Appendix A, Figure 11) are described in the "Land" section of this INRMP.

The GA DNR identified eight significant natural communities on Robins AFB during its field surveys in 1993 and 1994 (Appendix A, Figure 6): (1) relict successional longleaf pine forest, (2) relict upland hardwood bluff forest, (3) gum pond, (4) bay swamp, (5) gum-cypress pond, (6) old growth bottomland hardwood swamp, (7) creek forest, and (8) Grady freshwater meadow. Four of the eight significant community types (old-growth bottomland hardwood swamp, bay swamp, creek swamp, and gum-cypress pond) are located primarily in bottomland forest; the other four in transitional and upland forests. A detailed description of each of these natural community types is provided in the 1995 INRMP (Section 5.4).




A - LONGLEAF PINE FOREST
B - UPLAND HARDWOOD BLUFF
C - GUM POND
D - BAY SWAMP
E - GUM CYPRESS POND
F - BOTTOMLAND HARDWOOD SWAMP
G - CREEK FOREST
H - GRADY FRESHWATER MEADOW

Surveys for federal and state endangered, threatened, or rare plant species were conducted on Robins AFB in 1989, 1993 and 1994, and in 1998-1999 (NRCS 1989, GA DNR 1994, Earth Tech 1999). Comprehensive plant lists from these investigations are provided in Appendix C. Ten state-listed rare plant species are present on the Base including two protected species, Ocmulgee skullcap (*Scutellaria ocmulgee*), and Harper's Wild Ginger (*Hexastylis shuttleworthii var. harperi*).

## Water

Robins AFB, in the drainage basin of the Ocmulgee River, known as the Altamaha Basin, is drained by four unnamed intermittent creeks flowing from west to east into Horse Creek, which flows in a southeasterly direction to the Ocmulgee River (Appendix A, Figure 7). The direction of surface flow is from west to east, into one of the intermittent creeks or the wetlands on the eastern side of the Base. The stream, pond, and wetland habitats on Robins AFB are hydraulically interconnected and dynamic systems that change seasonally with precipitation and corresponding fluctuations in surface and ground water levels (Appendix A, Figure 8). Detailed information regarding the aquatic habitats and fish populations on the Base is included in the 1995 INRMP (Section 5.3).

Horse Creek and Sandy Run Creek provide most of the stream habitat at Robins AFB (Appendix A, Figure 8). Horse Creek is a small bottomland stream draining marshland in the northeastern portion of the Base. Sandy Run Creek, a significantly larger drainage, marks the southern boundary of the Base. Both creeks are tributaries of the Ocmulgee River and provide habitat for fish, reptiles, and amphibians and for many species of aquatic invertebrates.

There are three constructed lakes on Robins AFB and all are stocked with fish. Duck Lake (8.34 acres) is located centrally on the Base and is surrounded by a mosaic of upland forest and the trimmed grasses of residential housing along the southern shore and a golf course along the northern shore. Luna Lake (7.70 acres) is open-water habitat used primarily for recreation. Scout Lake (22.36 acres), once connected

to the wetlands, has been converted to limnetic habitat. This lake now is artificial open-water habitat.

Both perennial and ephemeral pond habitats are present on Robins AFB. The permanent artificial ponds primarily provide habitat for fish and turtles. Semi-aquatic snakes utilize pond banks and margin habitats. The ephemeral ponds created by rains and the seasonal flooding of the rivers and streams provide extensive aquatic habitat. A gum-cypress pond, created by the dam-building activities of beaver, located at the base of the upland hardwood bluff along Fort Valley Street provides aquatic habitat for frogs, toads, and turtles. In addition to the gum-cypress pond, there are several other ephemeral ponds associated with unique plant communities.

Inland wetlands are found near streams and rivers. Vegetation types within alluvial wetlands, which vary in response to the frequency of inundation, are classified into five zones on this basis: (1) plant communities that occupy permanent water courses and impounded areas, (2) river/swamp forests that are semi-permanently flooded throughout the year, (3) lower hardwood swamp forest, where soils are saturated 40-50 percent of the year, (4) forests in backwater and flat areas that are saturated only 20-30 percent of the year, and (5) transition to upland areas, with soils that are generally saturated less than 15 percent of the year. Wetlands are classified according to the USFWS National Wetland Inventory on the basis of vegetation type, topography, and hydrologic regime. One of the five major wetland systems recognized by USFWS, the palustrine, dominates at Robins AFB. Palustrine designates a shallow, standing-water marsh environment, including swamps and bogs. All of the wetland communities on Robins AFB fall within the palustrine, or marsh-like, category.

Wetlands occur on many of the semi-improved and unimproved tracts of land on Robins AFB (Appendix A, Figure 9). The most recent study undertaken to delineate and quantify the jurisdictional wetlands located on the Base was in 1999 (*Final Wetland Delineation for Warner Robins Air Logistics Center*) and was conducted in accordance with the criteria set forth in the Technical Report Y-87-1, Corps of Engineers, Wetlands Delineation Manual (1987 Federal Manual). This report should be consulted for further information, including detailed maps showing wetland perimeters.

## Land

The Geographic Information System (GIS) developed for Robins AFB, which incorporates files from the Base Civil Engineer Group (CEG), indicates that the installation encompasses 7,070 acres. The classes and acreages can be seen on the GIS maps for Robins AFB. The Land Use map is provided in Appendix A, Figure 10, and is derived from the turf management, recreation, vegetation association, and hydrography data layers. Land use categories are defined by the major grounds categories: improved, semi-improved, and unimproved. Improved grounds (3,696 acres) are covered by housing, administrative, and industrial facilities; parks, playgrounds, and athletic fields; and parade grounds and golf courses, as defined in AFI 32-7064. Semi-improved grounds (412 acres) are open fields. Unimproved grounds (2,961 acres) include the following categories, as defined in AFI 32-7064: agricultural outleased land, commercial forestry land,

wooded stream corridors, and wetlands. At Robins AFB, the unimproved grounds are mostly wetlands. However wetlands occur on many of the semi-improved tracts of land as well. Wetlands are

described in the "Water" section of this INRMP. Outdoor recreation opportunities are described in more detail in the "People" section of this INRMP.

There are eight turf management areas on the Base (Appendix A, Figure 11). These areas include semi-improved, improved and enhanced areas, the golf course and airfield, firebreaks, construction and vegetation control areas. Turf types on the Base include fields (dominated by patchy undifferentiated grasses); golf course (under intensive turf management); industrial/residential (maintained turf/lawns on industrial facilities and residential areas); recreational (playing fields, trap and skeet shooting range, and picnic areas); roadside turf areas (that parallel and are directly adjacent to roads); and airfield turf areas (that surround runways, taxiways, and tarmacs).

Definable areas of the Base have been categorized in terms of their suitability for certain developmental activities. Eight Management Emphasis Areas (MEAs) were developed based on mission-dependent development plans and natural resource management goals and objectives (EA 1995).

These MEAs (Appendix A, Figure 12) function as primary natural resource land management units and provide the framework for plan implementation by helping to determine appropriate locations for specific land uses and management practices.

| MEA | Acres |
|---|---|
| 1. Natural Habitat Preserve | 755.5 |
| 2. Managed Natural Habitat | 1,623.2 |
| 3. Natural Habitat Multiple Use | 405.4 |
| 4. Development Reserve | 179.0 |
| 5. Intensive Recreation and Training | 323.3 |
| 6. Lake and Watercourse | 74.4 |
| 7. BASH Reduction | 1,126.9 |
| 8. Urban Development | 2,581.6 |

# People

Outdoor recreational opportunities on the Base are designed to meet the increased recreation demand by personnel and facilities and activities for watching wildlife (Appendix A, Figure 13).

AFI 32-7064 recognizes three kinds of recreation areas, which range from high development and high use to minimal development and minimal use (Appendix A, Figure 14). Class 1, general outdoor recreation areas, can accommodate intensive recreational activities and occupy about 350 acres of land Robins AFB. These areas include camping, a nature center, golfing, skeet and trap shooting, archery, group picnicking, and lake water sports.

Class 2, natural environmental areas, provide dispersed types of recreation such as trail use, fishing, birdwatching, jogging, riding, and hunting (Appendix A, Figure 14). In principle, these areas occupy approximately 4,000 acres of Robins AFB, although a large proportion of that is in the wetlands.

Class 3, special interest areas, have unique cultural, historical, scenic, or ecological features, but have not yet been fully defined for Robins AFB, except for locations of rare plants. In these areas, providing recreation opportunities must be consistent with protection of the features that make the area unique. The recreation areas on the Base are shown on the GIS maps included in Appendix A, Figures 13, 14 and 15.

Class 1 Recreation opportunities include: 18-hole golf course; model aircraft runway; a multi-station competition archery course; a three-hut Boy Scout and Girl Scout outpost; and civilian recreation facilities. Dispersed recreation opportunities (Class 2) include 34 miles of trails and equestrian facilities. There are 10 ecological sites and 25 cultural resource sites that comprise the Class 3 areas (unique ecological and cultural resource sites) at the Base. The cultural resource sites are described in the 1999 *Cultural Resource Management Plan* for the Base.

Most of the ecological sites are located near the southern end of the Base. These sites present an opportunity for environmental education and nature study activities.

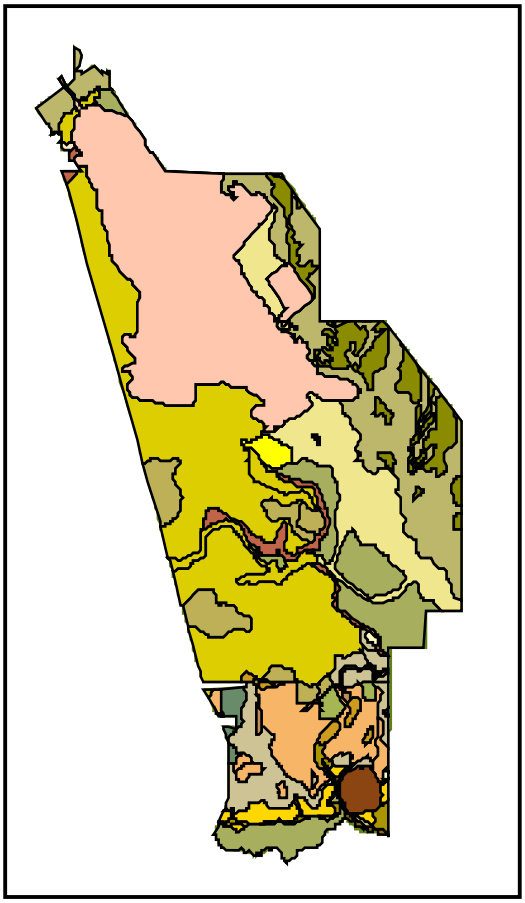
## Program Management

Natural resources program management includes integration with other AF programs, natural resources program assessments, assessing natural resources damage by other parties, and database development. In the event that natural resources under AF control are damaged by another party, such as by an accidental oil or chemical release, the installation must assess and claim damages. The Base must coordinate with MAJCOM, SAF/MIQ (the designated AF natural resources trustee), and AFLSA/JACE (AF legal).

The Integraph MGE-based GIS was installed at the Base to be used as an integral part of all natural resource management activities. This system currently is being converted to ESRI ArcView. The currently installed hardware and software represents a suite of tools that can be used to enter, access, analyze and plot mapped natural resources data. The natural resources data set contains data layers such as soils, wetlands, recreational areas, hydrography, floodplains, turfgrass areas, and other resources. Each graphical feature in each map is linked to a database table that contains descriptive information about that feature. Together they form a data layer.

In their current state, these data layers represent a starting point. Each data layer was derived from specific sources. The scale, accuracy, content, and date of each source is important and says a great deal about the reliability and usability of the resulting data layers. More detailed information has been included in the data sets when it is collected and additional data layers are developed to meet goals and objectives. These activities are part of the ongoing maintenance of the natural resource management GIS.

The natural resource management GIS contains adequate information so it can serve as a decision support tool for planners and decision makers. It contributes to overall better use and management of Base natural resources by making access to information about natural resources more efficient and accurate.



## Fish and Wildlife


- Protect, restore, and maintain populations of native threatened and endangered animal species consistent with federal regulations.
- Manage game and non-game fish and wildlife species according to the principles of ecosystem management.

## Plants


- Protect, restore, and maintain populations of native threatened and endangered plant species consistent with federal regulations.
- Manage forests including the urban forest, for long-term sustainability, diversity, and in concert with competitive uses.

## Water


- Protect jurisdictional wetlands and Waters of the U.S. from loss or degradation.

## Land


- Manage grounds in a manner that will optimize the conservation of existing ecosystems, and contribute to the enhancement of biodiversity.
- Reduce the bird aircraft strike hazard (BASH) through management of habitat near and on the airfield.

## People


- Provide outdoor recreation opportunities that promote the mental, physical, and social well-being of Base personnel, and minimize impacts on sensitive natural resources.

## Program Management


- Encourage better utilization and management of Base natural resources consistent with the Air Force mission.
- Use the Geographic Information System to facilitate environmental management and the decision-making process.

# Fish and Wildlife Resource Issues and Management Objectives

**Primary Management Goal**

- Protect, restore, and maintain populations of native threatened, endangered and sensitive (TES) animal species within the requirements of each organization's mission and within the requirements of the law.
- Manage game and non-game fish and wildlife species according to the principles of ecosystem management.

**Resources Management Issue**

Coordinate with Fish and Wildlife Agencies.

**Management Objectives**

- Coordinate fish and wildlife surveys and methodologies with the Georgia Department of Natural Resources (DNR) and U.S. Fish and Wildlife Service (USFWS), and solicit technical assistance on matters of fish and wildlife management, including pest problems.
- Develop updated cooperative agreements with USFWS and DNR for future assistance.
- Coordinate nuisance wildlife control activities with the DNR, the USFWS, and the Base Entomology Shop.

**Resource Management Issue**

Protect, restore, and maintain populations of native threatened, endangered and sensitive (TES) animal species within the guidelines of ecosystem management and consistent with federal regulations.

**Management Objectives**

- Conduct comprehensive TES surveys on unimproved grounds at least once every 5 years.
- Conduct site-specific surveys for TES prior to any significant ground- or habitat-disturbing activities on unimproved grounds.
- Continue coordination with USFWS and DNR on TES species surveys that are conducted at the Base. Contact USFWS for consultation under Section 7 of the Endangered Species Act for the management of federally listed TES.
- Continue monitoring population levels, habitat conditions, and community composition and areal extent to determine the long-term trends in TES species.

**Resource Management Issue**

Manage habitat to conserve game and non-game wildlife.

**Management Objectives**

- Improve, retain and develop habitat for watchable wildlife by selecting native plants suitable for use in landscaping of urban areas, improving existing habitat by changing the way grounds are maintained, and by providing educational programs. These measures should also be implemented on the golf course.
- Improve maintenance of nesting and roosting boxes, and examine potential locations for new boxes (Appendix A, Figure 16).
- Develop and implement appropriate short- and long-range management strategies to maintain populations of game and nongame species, primarily through habitat management.
- Evaluate options to improve hunting opportunities by leasing hunting rights from local landowners.
- Provide education on species that cause human problems such as deer flies, mosquitoes, ticks, and snakes.
- Monitor select game and non-game species and their habitats. Maintain a habitat inventory, and update this inventory every 5 years.

**Resource Management Issue**

Improve Fisheries on Robins AFB.

**Management Objectives**

- Sample fish populations every year in all three lakes and keep records of stocking/fishing levels.
- Implement fish habitat improvements, such as fertilizing lakes, installing fish attractors, reducing sedimentation of water bodies, improving water quality, and eradicating exotic aquatic weeds.
- Evaluate options to increase fishing opportunities by installing fishing platforms, and by improving access to Horse Creek.
- Conduct creel surveys to quantify fishing pressure, angler success rates, and angler needs.

# Plant Resource Issues and Management Objectives

**Primary Management Goal**

- Protect, restore and maintain populations of native threatened and endangered plant species within the requirements of each organization's mission and within the requirements of the law.
- Manage forests, including the urban forest, for long-term sustainability, diversity, and productivity and in concert with competitive uses.

**Resource Management Issue**

Protect, restore, and maintain populations of native threatened, endangered and sensitive (TES) plant species within the guidelines of ecosystem management and consistent with federal regulations.

**Management Objectives**

- Periodically update the inventory of TES species that was completed in 1999 (*Final Rare Plants Survey and Management Plan*).
- Conduct comprehensive TES surveys on unimproved grounds at least once every 5 years.
- Conduct site-specific surveys for TES prior to any significant ground- or habitat-disturbing activities on unimproved grounds.
- Continue coordination with USFWS and DNR on TES species surveys and management activities.
- Continue monitoring population levels, habitat conditions, and community composition and areal extent to determine the long term trends in TES species on Robins AFB
- Protect rare plants species, and conduct management activities to enhance their propagation.

**Resource Management Issue**

Reduce undesirable vegetation and enhance biological diversity.

**Management Objectives**

- Eradicate or control invasive exotic species and noxious weeds. Implement the 1999 *Invasive Plants Management Plan*.
- Continue the prescribed burn program to achieve vegetation management goals, and to reduce fuel loads. Develop a fire hazard management plan for undeveloped areas of the Base.
- Implement a landscaping plan to promote the use of native, drought-resistant species for ornamental and landscape plantings.
- Retain standing or fallen dead trees for wildlife habitat except for hazard trees, which should be removed.
- Promote growth or natural regeneration of native species.
- Take a "hands off" approach whenever possible in the Natural Habitat Management Emphasis Area (MEA).

**Resources Management Issue**

Protect and conserve forest resources.

**Management Objectives**

- Improve and retain forest resources, including forested wetlands and upland natural forests (Appendix A, Figures 4 and 5).
- Implement the 1995 *Tree Management Plan* to improve urban tree health and vigor (Appendix A, Figure 4). Protect urban trees, and promote reforestation of the Urban Development MEA, where possible.
- The urban forestry program should meet the requirements for a Tree City USA designation by the National Arbor Day Foundation.
- Restore and manage the relict longleaf pine and upland hardwood bluff forests.
- Manage pine plantations in the Development Reserve MEA for timber production, wildlife habitat, and for aesthetic values, as defined in the 1998 *Upland Forest Survey.*

**Resources Management Issue**

Manage vegetation to maintain or enhance security along the perimeter of the Base, or sensitive facilities.

**Management Objectives**

- Security can be enhanced through limited clearing of natural areas, or via pruning. These actions should be limited to the amount necessary to allow access for security and maintenance staff, to ensure integrity of fences or other barriers, and to make penetration of Base property by intruders observable.

## Water Resource Issues and Management Objectives

**Primary Management Goal**

- Protect jurisdictional wetlands and Waters of the U.S. from loss or degradation.

**Resource Management Issue**

Implement lake and watercourse protection actions to protect and restore these water bodies.

**Management Objectives**

- Restore vegetation along stream banks and lake shorelines to prevent erosion and sedimentation of water bodies. Implement the 1999 *Wetland Protection Plan*.
- Prevent the disturbance of shoreline vegetation in the Lake and Watercourse MEA. Implement Best Management Practices (BMPs), including the protection of Streamside Management Zones.
- Promote erosion control, as described in the *Manual for Erosion and Sediment Control in Georgia*, at construction sites and other areas where the ground vegetation cover is disturbed.
- Dredge sediment build-up from lakes and streams and reshape the channels to their original capacity and design.

**Resource Management Issue**

Protect water quality.

**Management Objectives**

- Reduce the amount of pesticides entering lakes and streams, especially at the Golf Course, through modification of application techniques and via the use of non-chemical controls.
- Apply BMPs to activities that may cause contaminants to come into contact with storm water runoff.

**Resource Management Issue**

Conserve water resources.

**Management Objectives**

- Promote use of treated wastewater in irrigating the Golf Course.
- Use drought-tolerant plant species in landscape designs, and confine irrigation practices to evening hours.

**Resources Management Issue**

Protect the natural features of floodplains, and protect personnel and property from flood hazards.

**Management Objectives**

- Ensure that 100-year floodplain data are current and accurate, and are maintained in the Base GIS.
- Review proposed developments to determine whether they will occur in the floodplain.

**Resource Management Issue**

Protect wetlands and Waters of the U.S. under the jurisdiction of the U.S. Army Corps of Engineers (USACE) from loss or degradation.

**Management Objectives**

- Maintain a policy of "no net loss" of wetland acreage, with emphasis on preserving wetland quality. Implement the 1999 *Wetland Protection Plan.*
- Consult with the USACE whenever a proposed project is likely to result in loss or degradation of existing wetlands.
- Continually update GIS coverage of jurisdictional wetland data used in Base planning, and ensure that wetland boundaries are defined in the field (Appendix A, Figure 9).
- Update wetland delineation periodically as required by the USACE.
- Monitor trends in habitat values of wetlands, and restore or enhance these habitats as appropriate.

## Land Resource Issues and Management Objectives

**Primary Management Goal**

- Manage grounds in a manner that will optimize the conservation of existing ecosystems, and contribute to the enhancement of biodiversity.
- Reduce the bird aircraft strike hazard (BASH) through management of habitat near and on the airfield.

**Resource Management Issue**

Manage habitats to protect sensitive ecosystems, and to protect personnel and aircraft.

**Management Objectives**

- Protect, and restore when necessary and feasible, significant natural communities (Creek Swamp, Bay Swamp, Old Growth Bottomland Hardwood Forest, Gum Pond, Gum-Cypress Pond, Grady Freshwater Meadow, Relict Upland Hardwood Bluff Forest, and Relict Successional Longleaf Pine Forest).
- Monitor significant natural communities to ensure that management objectives are being met.
- Reduce bird and other wildlife hazards to aircraft in the BASH Reduction MEA per the Robins AFB BASH Plan employing management strategies that are designed to deter these species.

**Resource Management Issue**

Maintain improved, semi-improved, and unimproved grounds to standards defined by the Air Force and the Natural Resource Conservation Service (NRCS).

**Management Objectives**

- Reduce the frequency of mowing on improved and semi-improved lands.
- Convert selected turf areas to other types of vegetation that require less-intensive maintenance.
- Convert improved to semi-improved grounds through the planting of trees, shrubs, native grasses and wildflowers in desired areas.
- Reduce application of pesticides by following principles of integrated pest management, and through the implementation of the 2000 *Pest Management Plan*. Work with the Base Entomology Shop to revise this plan annually.

**Resources Management Issue**

Enhance force readiness and increase mission effectiveness by improving the compatibility of outdoor recreation areas and facilities with adjacent land uses, activities, and customer needs.

**Management Objectives**

- Coordinate with the Base Planner on proposed developments including recreation facilities.
- Support mission effectiveness through integrated airfield management practices such as tree removal to increase flight safety and reduce wildlife hazards.

## People Resource Issues and Management Objectives

**Primary Management Goal**

- Provide outdoor recreation opportunities that promote the mental, physical, and social well-being of Base personnel, and minimize impacts on sensitive natural resources.

**Resource Management Issue**

Provide areas on Robins AFB to be used for education and recreation.

**Management Objectives**

- Maintain the existing nature trail near Luna Lake.
- Use the longleaf pine ecosystem project as an outdoor classroom and interpretive site.
- Plan for future development of additional recreation facilities such as nature trails, fishing piers, creek-side boardwalks, picnic areas, canoe trails, and bicycle trails, particularly in the Intensive Recreation MEA.
- Update the 1998 *Outdoor Recreational Facility Mapping* as necessary.

**Resource Management Issue**

Minimize the impacts of recreation activities on sensitive natural resources.

**Management Objectives**

- Regulate the use of all-terrain vehicles and other off-road machines to prevent damage to resources.
- Regulate the use of motorized boats and other watercraft on lakes and creeks.

**Resource Management Issue**

Promote participation in programs aimed to enhance learning about wildlife, habitat needs, and resource conservation.

**Management Objectives**

- Participate in *Partners in Flight*. The goal of this program is to develop a framework to improve communication, enhance cooperation, and to create a long-term strategy that would conserve Neotropical migratory birds.
- Participate in *Partners in Amphibian and Reptile Conservation*. This program promotes sound conservation and management of native U.S. herpetofauna (reptiles and amphibians), and provides educational efforts to raise public awareness about the conservation needs of reptiles and amphibians.
- Participate in *Watchable Wildlife*. The goals of this program are to: provide opportunities for the public to enjoy wildlife on public and private lands; promote learning about wildlife and habitat needs; and enhance active public support for resource conservation.

**Resources Management Issue**

Provide for public awareness of natural resources at Robins AFB.

**Management Objectives**

- Through the Public Affairs Office, provide informative materials for the Base newspaper, the Nature Center, and local media.
- Provide educational materials regarding natural resources to Base housing occupants.
- Maintain and update the natural resources section of the Environmental Management Directorate web page.
- Encourage volunteer participation in various aspects of the natural resources program, such as installation of nesting boxes, control of exotic weeds, and fish and wildlife surveys.
- Arrange cooperative projects with organizations such as Ducks Unlimited, The Nature Conservancy, The Georgia Master Gardener Association, and Boy Scouts of America.

**Resources Management Issue**

Promote outdoor recreation education.

**Management Objectives**

- Implement youth program for hunting and fishing safety.

## Program Management Issues and Management Objectives

**Primary Management Goal**

- Encourage better utilization and management of Base natural resources consistent with the Air Force mission.
- Use the Geographic Information System (GIS) to facilitate environmental management, and the decision-making process.

**Resource Management Issue**

Coordinate with other organizations to facilitate the management and protection of resources.

**Management Objectives**

- Continue to promote use of MEAs, established in the 1995 INRMP, in coordinating resource management efforts with land use and development activities.
- Continue to foster lines of communication between natural resource and civil engineering personnel as a standard operation procedure in Base planning, and continue regular meetings to discuss needs and concerns.
- Continue to incorporate, as an integral part of the planning process, the review and coordination of management strategies with cooperating local, state, and federal regulatory agencies prior to their implementation. Agencies include; USFWS, U.S. Department of Agriculture, NRCS, National Park Service (NPS), USACE, DNR, and the Georgia Forestry Commission.
- Maintain open lines of communication between Robins AFB natural resources personnel and various conservation and natural resources organizations and agencies, such as; DNR, NRCS, Sierra Club, and The Nature Conservancy.

**Resource Management Issue**

Use the GIS to facilitate environmental management.

**Management Objectives**

- Use the GIS to assist in the decision-making process, and make the GIS available to Base personnel.
- Maintain and update the natural resource database on the GIS system to facilitate base planning and decision-making.
- Provide public access to the current INRMP through the GIS.

# Plan Implementation

A primary goal of this plan is to maintain or enhance the existing diversity of fish, wildlife, and plant species found at Robins AFB by maintaining or enhancing the habitats necessary for these species to thrive. The management focus is on game species and common nongame species, protected or rare species, significant natural communities, wetlands, and biodiversity. Biologically diverse aquatic and terrestrial habitats are present on the Base. The quality of these habitats is dependent on watercourse characteristics or the type of vegetation present, physical and chemical conditions, and the degree of structural diversity or complexity present. Suitable habitat must provide conditions that allow an individual to thrive and reproduce.

Another primary goal of this plan is to provide recreation and educational opportunities for the enjoyment and understanding of natural resources and for contribution to high quality of life for Base personnel. All of this is facilitated through effective program management implementation.

Implementation of projects/programs is prioritized for the planning period based on:

1. Actions necessary for compliance with the law.
2. Actions necessary for Base mission/planning support,
3. Actions important to natural resource conservation goals, and
4. Actions implementing general conservation management objectives.

Some projects are shorter-term and may be completed during the planning period, while others are longer-term and may be ongoing throughout the planning period, and some future development projects may only be initiated during the present planning period.

## Fish and Wildlife Resource Management Implementation

***Primary Management Goal***

- Protect, restore, and maintain populations of native threatened, endangered and sensitive (TES) animal species within the requirements of each organization's mission and within the requirements of the law.
- Manage game and non-game fish and wildlife species according to the principles of ecosystem management.

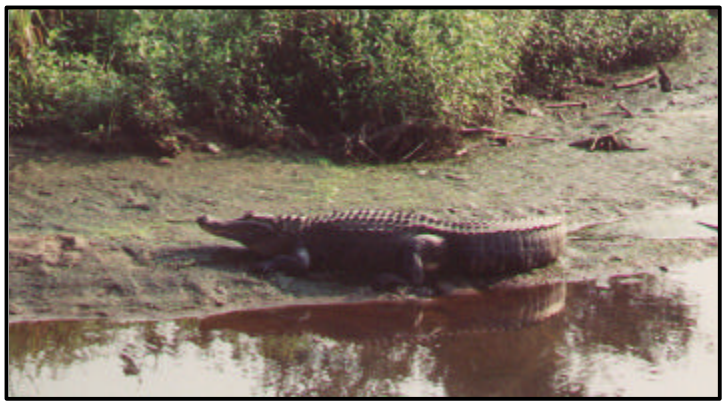
The fish and wildlife management implementation plan focuses on the maintenance and enhancement of both game and non-game species and the protection and restoration of TES animal species.

## TES Animal Species Protection

No TES animal species have been found on the Base, except for the American alligator (*Alligator mississipiensis*) which is listed because of similarity of appearance to the federally endangered American crocodile (*Crocodylus acutus*). The Base does provide habitat that would be suitable for at least transient occurrence of some other listed animal species. Implementation measures for TES species protection/enhancement are:

Conduct site-specific TES surveys on any unimproved grounds prior to any ground disturbing or other potentially disruptive activities.

Conduct on-going ecological study findings review and periodic basewide surveys in suitable habitats at least once every 5 years for the presence of federal- or state-listed animal species.



Coordinate survey methodology with the USFWS and Georgia DNR through informal communications or plan reviews.

Conduct Section 7 consultation with the USFWS for the management of any federally-listed species found on the Base in the future.

Passively maintain existing high quality habitat by avoiding/limiting future land disturbance and improve moderately significant habitat by planting or promoting the establishment of native plant species that would provide forage and shelter for wildlife with emphasis on the Natural Habitat Preserve and Managed Natural Habitat MEAs.

## Wildlife Conservation

Implementation of many of the management measures for plants, water, and land will indirectly protect and enhance habitat for wildlife in addition to the following direct implementation measures for wildlife maintenance and protection.

Improve maintenance of existing bird nesting and bat roosting boxes, to encourage greater frequency and diversity of wildlife usage, through the use of volunteer programs if possible. Monitor nesting and roosting boxes to determine usage rates, species using them and their nesting parameters, as well as maintenance needs of the structures. Examine potential locations for new nesting boxes along water features and in housing and recreation areas. Placement of new boxes should be consistent with the objectives of the BASH program.

Select locations and develop food plots to enhance wildlife with priority given to reducing wildlife damage problems and other conflicts where humans and wildlife compete for land use, such as the golf course and housing areas. Avoid actions that would inadvertently attract wildlife to hazardous waste sites on Base.

Conduct periodic surveys for game and non-game species, including bird censuses, spotlight surveys (as authorized by DNR) for deer and hog, small mammal censuses, reptile and amphibian inventories, and arthropod surveys.

Conduct a basewide wildlife habitat survey every 5 years to assess habitat status, quality, and management needs.

Maintain and improve forest resources, including forested wetlands and upland natural forests, by planting native plant species that will provide forage and shelter for wildlife species.

Leave upland hardwood forests in their natural state. The principal management activity for

wildlife in these forests is the control of exotic plant and animal (particularly feral cats and hogs) species. The principal means of controlling nuisance animal species is by deploying cage traps.

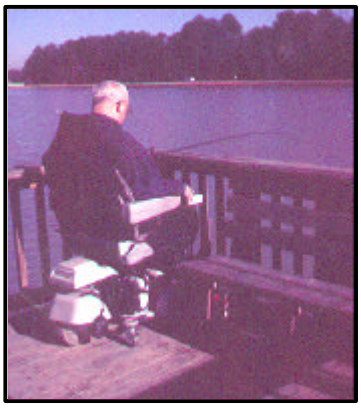
Allow passive conversion of pine plantations to mixed hardwood stands where possible to improve wildlife habitat quality by increasing diversity and forage quality. Integrate silviculture and wildlife management techniques in the Development Reserve MEA to manage for both sawtimber and wildlife habitat.

Manage the loblolly pine stands for timber production and for wildlife habitat diversity. Management prescriptions to promote wildlife habitat in these stands include periodic reductions of the density of pine trees (e.g., a fifth-row thin was conducted in these stands in Jan. 1999), implementing prescribed burning (experimenting with winter and summer burns) on a 3-5-year cycle in stands larger than 5 acres, controlling exotic species, snag creation and retention, the mechanical creation of gaps, and reducing pesticide use. Facilitate the establishment of weeds and fruit tree and shrub producing species such as blackberry, persimmon, plum, and sassafras around the perimeter of pine stands and mowed fields.

Provide education through Base communication media and service organizations related to actions personnel and residents can take to control problems such as potential contact with deer flies, ticks, mosquitoes, and snakes to further reduce human/wildlife conflicts.

Provide hunting opportunities for recreationists, including acquiring hunting leases, where possible. Monitor population parameters by collecting data at check stations. Enforce hunting and fishing regulations via a Memorandum of Understanding with USFWS and DNR (Appendix D).

Determine the demand for improved hunting opportunities and evaluate options for increasing opportunities through leasing hunting rights from local landowners. Consider compatibility with competing land uses and economic factors before undertaking any such action.



Use a variety of appropriate approaches to control nuisance wildlife species such as feral hogs, feral cats, beaver, coyotes, and other species. Control is carried out by the Base wildlife biologist or by personnel from the Base entomology shop. When necessary, assistance will be requested from the USDA (i.e., the Base has a contract with the Wildlife Services Division) or DNR. Detailed control strategies are outlined in RAFB Instruction 48-131 *Animal Control.*

## Fish Conservation

Implementation of many of the management measures for invasive/exotic plant control, water quality improvement and watercourse/wetland protection will indirectly support fish conservation and enhance fish production. Additional management measures that will serve to maintain and enhance fisheries resources are:

Sample fish in all three lakes each year with seine nets to determine fish stocking requirements. Conduct periodic creel surveys to quantify fishing pressure, angler success rates, and angler needs. Keep records of stocking and harvest levels and population characteristics.

Access to fishing sites along Horse Creek previously has been improved by removing fallen trees and other debris from the banks. Provide more access to Horse Creek by constructing fishing platforms. These platforms will support

access by the disabled and better protect stream bank vegetation from trampling.

Fishing piers have been installed at Scout and Luna Lakes. The possibility of installing a pier at Duck Lake should be evaluated, as well as a boat ramp at Scout Lake.

The fishery in Scout Lake is currently out of balance, as it is dominated by an overabundance of stunted prey fish species, particularly bluegill. This fishery needs to be ecologically balanced, either by renovation, or by introducing large numbers of mature bass and restricting bass anglers to catch and release only for 2-3 years at the lake.

The fishery in Luna Lake is inhibited by a lack of nutrients in that water body. Conduct an annual fertilization project to increase plankton, and thereby fish biomass, and reseal the basin of this lake if possible.

Basking platforms have been placed in lakes for aquatic turtles and evergreen trees and other debris have been placed in lakes to serve as artificial cover for fish. Maintain and expand these projects.

Protect sensitive fish and wildlife habitats from damage caused by human activities. Employ Best Management Practices to protect wetlands and Waters of the U.S. Restrict land disturbances within 40 feet of jurisdictional wetlands, unless authorized by permit. Maintain sod and trees around the perimeter of Luna and Scout Lakes, and on the large island in Scout Lake. Further reduce or eliminate mowing along streams, thereby reducing erosion and sedimentation problems. Additionally, restrict the use of off-road vehicles to established roads, as defined in RAFBI 32-7064.

## Plant Resource Management Implementation

***Primary Management Goal***

- Protect, restore and maintain populations of native threatened and endangered plant species within the requirements of each organization's mission and within the requirements of the law.
- Manage forests, including the urban forest, for long-term sustainability, diversity, and productivity and in concert with competitive uses.

Plant resource management is carried out under multiple programs that address protection and enhancement of TES plant species, forest conservation and timber management, and fire management.

## TES Plant Species Protection

There are 10 state-listed (watch, tracking, and protected) plant species present on the Base. The Ocmulgee skullcap and Harper's Wild Ginger are the only protected species.

### *Grady Meadow Wetland Species*

Six of the ten state-listed species are located in the Grady meadow wetland. Therefore, protection, management, and monitoring of this site is extremely important. Based on the existing short-term data and past experience of researchers, the optimal hydrological conditions for the Grady meadow wetland probably would include alternating wet and dry years. The wet year would benefit some species, while the alternating dry year would benefit other species.

The long-term monitoring program for awned meadowbeauty and the Grady meadow site includes the following:

1. Annual resampling of the permanent five-meter radius circular plot;

2. An inventory of all species utilizing a transect located across the wetland;
3. An inventory of all flowering awned meadowbeauty and Boykin's Lobelia plants in late June of each year; and
4. Annual monitoring of the hydrologic conditions of the wetland.

The ecological and hydrologic requirements of the four "watch list" species found in the Grady meadow wetland are similar to those of the awned meadowbeauty. If the awned meadowbeauty population is stable, the population of the other species should also be stable. Furthermore, their presence or absence can be discerned from annual transects of the wetland.

### Ocmulgee Skullcap

Previous observations suggest that annual mowing is necessary for the maintenance of a flowering/fruiting population of the Ocmulgee skullcap. Mowing helps to keep competing species in check. Based on the ecology and phenology of the species, it is recommended that mowing at the northern site be carried out in December, January, or February. The understory should be mowed to a height of approximately three to six inches.

Because of the topographic nature of the southern site, hand-clearing of understory exotics may be necessary. A small area along the bluff could be cleared of exotics and monitored for several years to observe the effects of understory maintenance on the skullcap population. Care should be taken to minimize soil impacts (either from compaction or scarification) because the roots of the skullcap could be damaged.

Sample the five-meter radius circular permanent plot established at the northern site for annual monitoring in July of each year.

### Harper's Wild Ginger

Although observed populations appear to be healthy carry out a more detailed examination to quantify the species vigor at Robins AFB. Two five-meter radius circular permanent plots have been placed in the Harper's wild ginger populations. Complete annual inventories of stems and flowers during mid- to late May in each circular plot. Compare inventory data to previous data to assess population status. Total number of flowers is a good indicator of sexual production in the species, while total number of leaves is a good indication of asexual production. Because Harper's wild ginger flowers so irregularly, leaf count will most likely be the best indicator of plant health.

### Oval Lady's Tresses

Because orchids may exist several years in a dormant, underground state, it is premature to conclude that this plant no longer occurs on Robins AFB. Revisit the historic site for this population annually in early October. It should be noted that the Grady meadow wetland is the same wetland in which peat moss sedge, a state watch list species, was identified. No active management of this site is recommended. Hydrological monitoring of the site should be considered, but the natural condition of the site should not be altered.

## Invasive/Exotic Plant Control

The invasive plant species threat at Robins AFB is classified as posing a severe, significant or low threat. Recommended control methods and implementation periods are listed by threat category and species in the following table.

| Species | Recommended Control Method | Implementation Period |
|---|---|---|
| **Severe Threat** | | |
| Autumn Olive<br>*Elaeagnus umbellata* | Mechanical (cutting) | During flowering (May-June) |
| Privet<br>*Ligustrum japonicum* | Mechanical (hand pulling) for small plants, Chemical (Glyphosphate or Triclopyr via cut stump method) for mature plants. | Growing season |
| Japanese Honeysuckle<br>*Lonicera japonica* | Chemical (Glyphosate immediately following first frost) | Late Autumn (immediately following first frost) |
| Kudzu<br>*Pueraria lobata* | Mechanical (grubbing) for the northern population Chemical root crown method for south population | Growing season |
| Multiflora Rose<br>*Rosa multiflora* | Chemical (Triclopyr via basal bark method) | All year (not effective when ground is frozen) |
| Chinese Tallow tree<br>*Sapium sebiferum* | Chemical (Triclopyr via basal bark method) | All year (not effective when ground is frozen) |
| **Significant Threat** | | |
| Mimosa<br>*Albizia julibrissin* | Mechanical (repeated cutting) | During flowering (May-June) |
| Alligatorweed<br>*Alternanthera philoxeroides* | Biological (alligatorweed flea beetle) | Late Spring (May or June) |
| English Ivy<br>*Hedera helix* | Mechanical (hand-pulling of small sprouts, cutting of large aerial stems) | All year |
| Asian Spiderwort<br>*Murdannia keisak* | Chemical (Glyphosate spray) | Growing season |
| Chinese Wisteria<br>*Wisteria sinensis* | Chemical (Triclopyr via stump cut method), Mechanical (repeated cutting) | All year (not effective when ground is frozen) |
| **Low Threat** | | |
| Bahia Grass<br>*Paspalum notatum* | Chemical (Embark and Oust Combination) | Start immediately following emergence |
| Nandina<br>*Nandina domestica* | Mechanical (cutting) | All year |
| Photinia<br>*Photinia serrulata* | Mechanical (cutting) | All year |

## Forest Conservation and Management

Forest conservation at the Base encompasses upland, bottomland, and urban forested areas and emphasizes sustainability, productivity, control of exotic plants, restoration, and wildlife enhancement.

The upland forests, including the loblolly pine stands, were inventoried and mapped in 1998 and detailed silvicultural prescriptions were devised for each of the loblolly stands. These prescriptions are described in the *Upland Forest Survey*. The pine stands and many of the small pine woodlots were thinned in January 1999 or January 2000, respectively. Long-term plans include establishment of new pine stands either via clearcutting and planting of bare root stock, or via the seed tree method. The regeneration need, and method, will be determined based on mission requirements. Inspect areas of natural or artificial regeneration annually for the first three years to evaluate seedling survival.

Two significant upland forested communities, a relict longleaf pine site and a hardwood bluff, are being restored. The restoration of the longleaf site was initiated in January 1999. The management prescription for the upland hardwood bluff forest follows.

**Directives for Restoration and Management of Relict Upland Hardwood Bluff Forest**

- Flag known locations of Ocmulgee skullcap within this plant community.
- Evaluate alternative methods for controlling or eliminating non-native plant species that have become established in this community. Priority should be given to removing non-native vegetation encroaching on Ocmulgee skullcap.
- Investigate methods to encourage expansion of Ocmulgee skullcap populations in this community, including use of different mowing regimens.
- Limit recreational activities in the vicinity of known locations of the rare plant species.
- Investigate methods of promoting natural regeneration of the dominant plant species in the relict upland hardwood bluff forest community. If direct management of vegetation is required, including replanting of desirable species, develop approaches that minimize the need for repeated, long-term human intervention.

Maintain the 25-acre longleaf pine forest ecosystem via a 3-5 year prescribed burning regime (winter burns). Assess longleaf seedling survival annually, and plant new seedlings as needed. Retain and protect snags from fire damage.

The urban forest was inventoried and mapped in 1994. This inventory included assessment of tree health and maintenance needs, as well as tree planting needs. The urban forest is inspected weekly to identify trees in need of maintenance or removal, to identify disease or pest problems, and to prevent damage to trees caused by construction

and other human activities. Robins has met all of the requirements for Tree City USA status in each of the last 8 years, including a tree management board (see Appendix A, RAFBI 32-7064). Additionally, 1,000-2,000 trees (primarily native species) are planted in the urban areas each year. A tree farm has been established to provide trees to be used for future landscaping projects, or to replace trees removed during construction projects.

Update the urban forest database annually, to include trees removed or planted within the past year.

The wetland forests are generally left in their natural state, except where mission requirements dictate otherwise (e.g., the clearcut north of the runway). A study is currently being conducted to determine whether the creation of sporadically located gaps in the bottomland hardwood forest might provide improved habitat for understory nesting birds and other species of wildlife.

### *Prescribed Burning*

There are two primary goals for the use of prescribed burning as an ecosystem management tool:

1. Recognize the importance of fire as a natural ecological factor affecting native vegetation, and use controlled burning under carefully selected conditions to achieve biodiversity and ecosystem management objectives.

2. Actively work with other agencies to develop a research and training program designed to increase understanding of the ecological role of fire in vegetation native to Houston County. Investigate the interaction between past and present fire suppression and other management activities and existing fire hazard conditions, and develop practical approaches to implementation of prescribed burning as a vegetation management tool on Robins AFB.

### Fire Management Program Directives

- Follow all federal, state, and local air pollution laws and regulations. Such constraints will be considered in developing and implementing fire management plans.
- Follow all state prescribed burning standards and regulations.
- Site-specific planning for all prescribed burns will be conducted by trained or certified natural resources management personnel, and approved by Base fire management staff prior to project implementation. Such planning will include: written description of the proposed burn unit; statement of management objectives; requirements for pre-burn biological surveys for special-status species; requirements for pre- and post-burn environmental monitoring; requirements for a cultural resources survey if in sensitive zone; other preparation required prior to implementation (pre-established control lines, protection of sensitive species and habitats, definition of size and locations of individual burn cells within the burn unit if safety or ecological concerns dictate that the unit cannot be burned as a whole, etc.). In addition, the planning report will also address weather parameters, fuel moisture conditions, resource coordination requirements, provision for public and worker safety, burn day notification of appropriate agencies and persons, smoke management analysis, control line placement and standards, specific firing tactics and ignition methods, and mop-up and patrol procedures.
- Prescribed burns will be conducted with the assistance of the Georgia Forestry Commission.
- Use prescribed burning to reduce potentially hazardous natural and activity fuel loadings in a safe, carefully controlled, and environmentally sound fashion to achieve prescribed objectives.

Fire hazard mitigation actions undertaken for public safety objectives are implemented using the following general priorities: highest priority for the Urban Development MEA and in vicinity of key Base facilities (e.g., to create a fire hazard reduction zone around the "Christmas tree" jet parking area); intermediate priority for the Intensive Recreation, Development Reserve, and Natural Resource Multiple Use MEAs; and lowest priority in the Natural Habitat protection and Natural Habitat Management MEAs. Other factors used in developing priorities, include areas that have limited accessibility, contain hazardous or critical facilities, have limited water supplies for fire fighting, require long response time, have high fuel loading conditions, or that might impact water quality.

The following tract plow line standards are utilized for fire suppression:

1. Use the minimum number of plow lines necessary to contain the fire.
2. Fire plow line depth should be no greater than the minimum required to contain the fire.
3. Fire plow lines should not be located in habitat ecotones unless required by the emergency nature of the incident. Offset plow lines well to the side of the transition zone between habitats, if possible.

4. Fire plow lines should be oriented along contours whenever possible.
5. Fire plow lines will not be located within 300 feet of special-status species locations and sensitive habitats unless the potential damage from the fire exceeds impacts from tractor plow lines.
6. Plow lines will not bisect or tie into waterways or riparian zones, or impact significant or potentially significant cultural resource sites, or be placed downhill at right angles to steep slopes unless required by the emergency nature of the incident. All plow lines with potential for erosion will be stabilized and rehabilitated following the emergency suppression action.

## Security in Forested Areas

Follow these natural resource management guidelines during activities to maintain or enhance Base security:

Where needed, natural vegetation can be removed from perimeter boundaries of the Base, or specific facilities located on the Base (e.g., PAVE PAWS). Cleared areas should be as wide as required by regulations to allow access for security and maintenance staff, to ensure that the integrity of fences or other barriers has not been compromised, and to make penetration of Base property by intruders observable. In most cases, a cleared buffer of 20-30 feet or less will be sufficient.

Vegetation can be pruned, or cleared if necessary, to enhance visual access of Base areas by security personnel.

## Water Resource Management Implementation

***Primary Management Goal***

- Protect jurisdictional wetlands and Waters of the U.S. from loss or degradation.

Water resource management plan implementation is intended to protect and restore the watercourses and impoundments within the Base. The watercourses refer to the creeks as well as the man-made ditches that transport storm water runoff through the Base. The impoundments are all bodies of standing water, natural or man-made, which are intended to have permanent water retention.

## Lake and Watercourse Protection

The main concerns that presently exist for lake and water course protection are:

1. Erosion along the channel banks and lakeshores,
2. Non point source pollution entering the water bodies,
3. Watershed erosion entering the water bodies.

### Prevention of Erosion

The State of Georgia Best Management Practices (BMPs) for soil erosion and sediment control are designed to minimize erosion and resultant sedimentation. The BMPs include all of the erosion control techniques included *in The Manual for Erosion and Sediment Control in Georgia* (Georgia Soil and Water Conservation Commission, 2000).

Additionally, the BMPs include the following:

1. Stripping of vegetation, regrading, and other development activities shall be conducted in such a manner so as to minimize erosion;
2. Cut and fill operations must be reduced to a minimum;
3. Development plans must conform to topography and soil type, so as to create the lowest practicable erosion potential;
4. Whenever feasible, natural vegetation shall be retained, protected, and supplemented;
5. The disturbed area and the duration of exposure to erosive elements shall be kept to a practicable minimum;
6. Disturbed soil shall be stabilized as quickly as practicable;
7. Temporary vegetation or mulching shall be employed to protect exposed critical areas during development;
8. Permanent vegetation and structural erosion control measures must be installed as soon as practicable.

Implementation of sediment and erosion control activities on the Base follows the guidelines cited above. Further implementation practices for specific activities include the following:

- Implement erosion control practices at construction sites and areas where the ground or vegetation cover is disturbed.
- Prepare a land-disturbing activity plan for each activity that involves disturbing areas 1 acre or larger.
- Obtain a "Soil Erosion and Sedimentation Control Permit" from the Houston County Public Works Department for construction projects that create soil disturbance of 1 acre or more.

The land-disturbing activity plan provides for the control of soil erosion and sedimentation resulting from a land disturbing activity such as site development. It provides instructions for the preparation of detailed site plans in order to accomplish one or more of the following:

- Provide suitable sites for buildings, roadways, facilities and other land uses,
- Improve surface drainage,
- Control soil erosion and sediment deposition.

The land-disturbing activity plan must be based upon adequate surveys, resource data and investigations. Erosion and sediment control measures must be designed in accordance with the applicable standard applied herein. Practical combinations of the following guidelines shall be utilized, as a minimum, in planning for any land-disturbing activity:

## Land-Disturbing Activity Planning Directives

***1. Fit the activity to the topography and soils.*** Detailed planning should be employed to assure that roadways, buildings and other permanent features of the activity conform to the natural characteristics of the site. Large graded areas should be located on the most level portion of this site. Areas subject to flooding should be avoided. Areas of steep slopes, erodible soils and soils with severe limitations for the intended uses should not be utilized without overcoming the limitations through sound engineering practices. Erosion control, development and maintenance costs can be minimized if a site is selected for a specific activity.

***2. Minimize the disturbed area and the duration of exposure to erosion elements.*** Clearing of natural vegetation should be limited to only those areas of the site to be developed at a given time. Natural vegetation should be retained, protected and supplemented whenever practicable with construction scheduling employed to limit the duration of soil exposure. Major land clearing and grading operations should be scheduled during seasons of low potential runoff.

***3. Stabilize disturbed areas immediately.*** Permanent structures, temporary or permanent vegetation, and mulch, or a combination of these measures, should be employed as quickly as possible after the land is disturbed. Temporary vegetation and mulches can be most effective on areas where it is not practical to establish permanent vegetation. These temporary measures should be employed immediately after rough grading is completed if a delay is anticipated in obtaining finished grade. The finished slope of a cut or fill should be stable and ease of maintenance considered in the design. Stabilize all roadways, parking areas, and paved areas with the gravel subbase, temporary vegetation or mulch.

***4. Retain or accommodate runoff.*** Runoff from the development should be safely conveyed to a stable outlet using storm drains, diversions, stable waterways or similar conservation measures. Consideration should also be given to the installation of storm water retention structures to prevent flooding and damage to downstream facilities resulting from increased runoff from the site. Temporary or permanent facilities for conveyance of storm water should be designed to withstand the velocities of projected peak discharges. These facilities should be operational as soon as possible after the start of construction.

***5. Retain sediment.*** Sediment basins, sediment barriers and related structures should be installed to filter or trap sediment on the site to be disturbed. The most effective method of controlling sediment, however, is to control erosion at its source. Sediment retention structures should be planned to retain sediment when erosion control methods are not practical, or insufficient, or in the process of being installed, or have failed due to some unforeseen factor. Plans for maintenance of sediment control structures and removal of collected sediment following construction shall be developed prior to starting construction.

***6. Do not encroach upon watercourses.*** Permanent buildings should not be subjected to flooding, sediment damage, or erosion hazards. Earth fills should not be constructed in flood-prone areas that would adversely obstruct water flows or increase downstream velocity of water flows. When necessary to span a flood prone area or watercourse, bridge or culvert openings should be sized to permit passage of peak discharges without causing undue restrictions in water flows or without creating excessive downstream velocities. Uses of flood prone areas should be limited to activities which would not suffer excessive damage from flooding, scour, and sediment damages. Temporary bridges or culverts should be employed when construction equipment is required to cross natural or constructed channels.

### Construction Site Vegetation Restoration

Implement a revegetation plan for any areas of exposed ground in order to reduce erosion of exposed soil surfaces. It is recommended that standard vegetation planting practices from the Natural Resource Conservation Service (SCS 1989) be adopted. Apply these practices to all watershed surfaces where exposed soil is present. Below are some of the major practices to be incorporated in a revegetation plan.

Plant vegetation, such as trees, shrubs, vines, grasses, or legumes, on highly erodible or critically eroding areas. Examples of applicable areas are eroded fields, disturbed levees, excavation sites, road construction areas, or gullied areas where vegetation is difficult to establish by usual planting methods.

Use conventional planting methods where possible.

Consider using companion crops which aid in getting permanent cover established, especially when mixed plantings are done during marginal planting periods.

Use block sod in controlling erosion adjacent to structures.

Consider using irrigation, especially when late season plantings are done.

Use low maintenance, native plants in most cases to ensure long-lasting erosion control.

Include wildlife plantings in critical area plantings.

**Suitable Trees For Erosion Control**

| Site | Soil Material | Common Soils | Tree Species[1] | Spacing | Best Planting Dates |
|---|---|---|---|---|---|
| Borrow areas, graded areas, and spoil material. | Sandy | Lakeland, Troup | Loblolly pine (*Pinus taeda*) | 2 | 12/1-3/1 |
| | | | Longleaf pine (*Pinus palustris)* | | |
| | | | Slash pine (*Pinus elliottii*) | | |
| | Loamy | Orangeburg, Tifton | Loblolly pine | 2 | 12/1-3/1 |
| | | | Slash pine | | |
| | Clay | Cecil Faceville | Loblolly pine | 2 | 12/1-3/1 |
| | | | Slash pine | | |
| Streambanks | | | Willows[4] (*Salix* species) | 2 ft. x 2 ft. | 2/15-3/15 |

Notes:

1. Other trees and shrubs may be interplanted with the pines for improved wildlife benefits. Hardwood species such as oaks, bays, and hickories, as well as soft mast-producing species such as mulberry and native persimmon that may have higher wildlife value should be considered for planting.
2.

| Types of planing | Tree spacing | Tree/acre |
|---|---|---|
| Trees alone | 4 ft. x 4 ft. | 2,722 |
| Trees in combination with grasses and/or other plants | 6 ft. x 6 ft. | 1,210 |

3. Best planting dates for coastal plain sites, such as Robins AFB, according to SCS (1989).
4. Fertilization of companion crop is ample for this species.

### Watercourse Vegetation Restoration

Develop a vegetation restoration plan to restore the vegetation along channel banks and lakeshore so that the bank material does not erode into the water system.

The purpose of the plan is to stabilize and protect the banks of streams, lakes, wetlands, or

excavated channels against scour and erosion by vegetative means. The vegetation restoration plan applies to natural or excavated channels where the stream banks are susceptible to erosion from the action of water, ice, or debris or to damage from livestock, pedestrian or vehicular traffic. It also applies to controlling erosion on shorelines where the problem can be solved with relatively simple structural measures, vegetation, or upland erosion control practices and where failure of structural measures will not create a hazard to life or result in serious damage to property.

Since each watercourse requiring protection is unique, measures for streambank and shore protection must be installed according to a plan adapted to the specific site. The following is a partial list of elements that may be involved in a plan for streambank protection:

*Obstruction Removal* – The removal of fallen trees, stumps, debris, minor ledge outcroppings, and sand and gravel bars that might cause local current turbulence and deflection. Note: a fisheries biologist should be consulted prior to removal of large woody debris to determine if removal of such debris would significantly degrade fisheries habitat.

*Banksloping* – The reduction of the slope of banks to provide a suitable condition for vegetative protection or for the installation of structural bank protection.

*Fencing* – Artificial obstructions to protect vegetation needed for streambank protection or to protect critical areas from damage from stock trails or vehicular traffic.

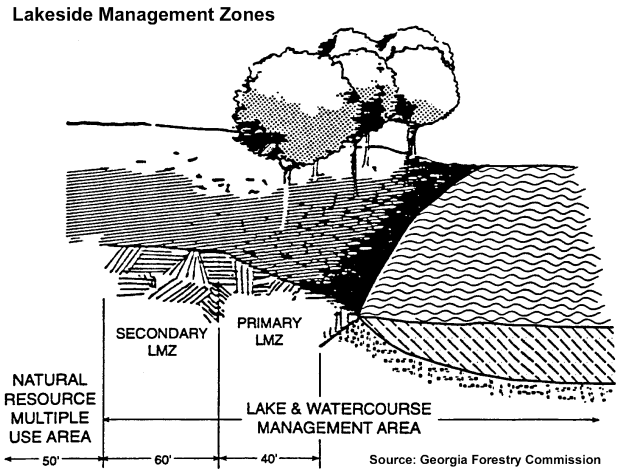
*Clearing* – The removal of trees and brush which adversely affect the growth of desirable bank vegetation and which are in immediate danger of falling into the stream.

*Vegetative Protection (grass and herbaceous plants)* – The lining of the streambank or shoreline with vigorously growing shrubs, grasses, or trees, or a combination of them.

Special attention will be given to maintaining or improving habitat for fish and wildlife. Consideration shall be given also to the use of construction materials, grading practices, vegetation, and other site development elements that minimize visual impacts and maintain or complement existing landscape uses such as pedestrian paths, climate controls, and buffers.

### *Lake and Watercourse Management Zones*

Develop Lake and Watercourse Management Zones that will prevent existing shoreline vegetation and banks from being disturbed. Establish Lake and Watercourse Management Zones for the three main lakes (Scout, Duck, and Luna lakes) and each of the watercourses on the Base that have not been channelized. These zones identify the level of use that is allowed along the edges of the streams and lakes.




There are areas of the Base where mowing occurs down to the lake bank. Discontinue mowing and plant native grasses or low maintenance plants or allow growth to revegetate the shoreline zone in natural areas.

**Lake and Watercourse Management Zones**

| Zone | Purpose | Distance | Permitted Uses |
|---|---|---|---|
| Zone I | To protect the banks of the lakes and streams. This will help to maintain the stability of the channel banks and lakeshore. | 40 ft. | Limit pedestrian access. Provide access by walkway where practicable. Prohibit mowing in natural areas such as the east side of Duck Lake. |
| Zone II | To protect the watershed area adjacent to the stream or lake. This helps to prevent erosion from entering the water body. | 60 ft | Low intensity activities are allowed. Minimize permanent recreational structures. (Such as picnic tables, camping, barbecue pits, etc.) |
| Zone III | This zone delineates where higher intensive use activities are allowed. | 50+ ft | High intensity recreational activities and permanent or semi-permanent structures are allowed. |

### *Restoration of Water Body Condition*

Several of the channels and lakes have accumulated significant amounts of silt from eroded sediment that has settled out. Restoration measures that can be implemented to restore lakes, ponds, and streams to a more natural and healthy condition than currently exists include:

Dredge impoundments that have accumulated significant amounts of sediment. Accumulated sediment is reducing the capacity of the lake for flood control as well as reducing esthetic and fisheries habitat qualities.

Provide an impermeable liner for those lakes that are experiencing adverse seepage. The liner could be a clay layer or a synthetic membrane.

Dredge the channels that have accumulated significant amounts of silt. This dredging will restore the channel to its original design capacity. The dredged material should be disposed in a suitable location which will not allow wash back into the channel. The dredging should be performed prior to any revegetating along the channel banks.

Restore any dredged channel banks to a 1 vertical to 3 horizontal side slope. The reshaped banks should be revegetated and silt screens should be used to control erosion until the vegetation is reestablished.

Perform the dredging maintenance operation during periods when heavy rains are not expected.

For drainage canals that are receiving sediment from off-Base sites, the sediment should be trapped by silt screens, or low flow hay bails, at a location just inside the Base.

## Water Quality Protection

The following planning measures are implemented to protect and improve water quality on the Base.

### *Pesticide Use Reduction*

Reduce the amount of pesticides entering the lake and canal system by reducing usage on the Base. Pesticides are typically applied to the grounds to control the production of weeds and nuisance insects. These applications can enter the water system by three primary pathways:

1. Applications sprayed directly on the water surface
2. Overspray from application unintentionally enters the water
3. Previous applications to sites within the watershed result in residues being flushed into the water system by storm water runoff

Eliminating the application of pesticides is not a viable alternative on the Base. Recommended Best Management Practices (BMPs) that will help to reduce the amount of these nonpoint source contaminants from entering the lakes and canals:

1. Reduce the amount applied within the watershed to the minimum necessary.
2. Investigate non-chemical control methods, such as manual vegetation removal or biological pest control.
3. Review the application schedule to determine if less frequent applications would be adequate.
4. Avoid making applications prior to any rainfall.
5. Investigate using less toxic pesticides that biodegrade in a shorter period of time.
6. Reduce the amount of pesticides that are applied near bodies of water. Applying these chemicals adjacent to a lake or canal greatly increases the chance that contamination of the water will occur. Contamination can occur by overspraying, direct runoff into the water, or subsequent flushing into the water by storm water runoff. Eliminate the application of pesticides within Zone 1 of the stream and lake management zones. Reduce the amount applied to Zone 2 by making applications only as needed.

### *Storm Water Runoff Management*

Apply BMPs to activities that may cause contaminants to come into contact with storm water runoff. Make sure that the Base NPS program and BMPs are consistent with the Georgia NPS Pollution Management Program.

Conducted activities that generate pollutants in uncovered areas, such as vehicle maintenance, chemical or waste oil storage, loading and unloading of potential contaminants, in covered areas so that storm water will not wash contaminants into a local stream.

Retain and divert contaminated storm water runoff to the sanitary sewer system in areas that cannot be covered.

Prohibit any dumping of contaminants into the storm drain system. This includes wash water from vehicle washing, dumping of household wastes, and non-storm drain connections to the storm water system. Label all storm drains with signs.

## Water Resource Conservation

In addition to the lake and watercourse conservation and enhancement implementation measures, the following implementation measures will facilitate the conservation of water use on the Base:

Promote and investigate opportunities for using treated wastewater for irrigation of the Golf Course. The use of treated wastewater for this purpose requires approval from the US Environmental Protection Agency (USEPA) and/or the State of Georgia as well as an approved National Pollutant Discharge Elimination System (NPDES) permit.

Use drought-tolerant plant species or species adapted to local conditions in preparing landscape designs to minimize the need for landscape plant irrigation.

Confine irrigation practices to the evening hours to minimize evaporation and maximize benefits from watering.

## Floodplain Protection

Previous implementation measures related to habitat enhancement, lake and watercourse protection, enhancement, and restoration will protect floodplain function and values. Additional measures that will serve to protect natural features of floodplains and protect personnel and property from flood hazards include:

Review 100-year floodplain data to ensure that the flood zone information is current and accurate. Maintain the current data on the Base GIS for use in planning, design, siting, and environmental assessment activities.

Review proposed development plans to determine whether they will occur in the floodplain. Minimize land-disturbing development activity in the floodplain and ensure that any development is consistent with regulatory requirements and natural resource management goals.

Development actions in the floodplain require a Finding Of No Practical Alternative (FONPA) for compliance with AF Order 790.1.

## Wetlands Protection

The previous erosion control and restoration measures also will serve to protect wetlands from future degradation. The principal adverse conditions potentially affecting wetland quality identified in the 1999 *Wetland Protection Plan* were:

1. Gully, road and channel erosion,
2. Stream bank slumping, and
3. Off-base inflows of sediment and debris.
4. A substantial amount of sediment has eroded into the wetlands and waterbodies on the Base. Most sediments in forested wetlands are best left in place. The area most likely to benefit from dredging these sediments is Scout Lake.

### *"No Net Loss" Policy*

Maintain a policy of "no net loss" of wetland acreage, with an emphasis on preserving existing wetlands, and consult with USACE whenever a proposed project is likely to result in loss or degradation of existing wetlands.

The policy of "no net loss" is best achieved by following these mitigation guidelines:

1. Avoid impacts to wetlands whenever possible by redesigning projects to stay out of wetlands.
2. When avoidance is not possible, minimize the amount and extent of impacts on wetlands.
3. Compensate for loss of wetland acreage or functional value by restoring or enhancing degraded natural wetlands. Creation of new wetlands should be considered only if restoration or enhancement alternatives are not feasible.

Development actions in wetlands require a Finding Of No Practical Alternative (FONPA) for compliance with AF Order 790.1.

### *Monitoring and Documentation*

Update the current wetland delineation periodically as required by the USACE.

Review and maintain current wetland boundaries on the Base GIS. Current jurisdictional wetland data and maps will assist Base planning in ensuring that planned developments will not adversely impact wetland areas.

Periodically monitor trends in wetland habitat value and quality and enhance or restore areas as appropriate.

## Land Resource Management Implementation

***Primary Management Goal***

- Manage grounds in a manner that will optimize the conservation of existing ecosystems, and contribute to the enhancement of biodiversity.
- Reduce the bird aircraft strike hazard (BASH) through management of habitat near and on the airfield.

Land resource management is guided in part by the goals for ecosystem management cited by The Nature Conservancy in *Conserving Biodiversity on Military Lands: A Handbook for Natural Resource Managers* (Leslie, et. al., 1996). These goals are:

1. Maintain viable populations of all native species *in situ*.
2. Represent, within protected areas, all native ecosystem types across their natural range of variation.
3. Maintain evolutionary and ecological processes (i.e., disturbance regimes, hydrological processes, nutrient cycles, and so forth).
4. Manage over periods of time long enough to maintain the evolutionary potential of species and ecosystems.
5. Accommodate human use and occupancy within these constraints.

## Ecosystem Management

General guidelines for ecosystem management are listed below. Related implementation measures and guidelines are described in respective fish and wildlife, plants, and water resources sections.

Evaluate current conditions and trends, and potential impacts, at several scales. Focus efforts on maintaining viable populations of TES species and more common species of plants and animals and on maintaining the existing biodiversity and ecological health or integrity of habitats, natural communities, and ecosystems. Protection of biodiversity will have positive benefits at both local and regional scales. The undeveloped areas on Base can serve as core protected habitat areas that will help maintain biodiversity within the Ocmulgee River floodplain and surrounding region. Periodically monitor significant natural communities (Creek Swamp, Bay Swamp, etc.) to ensure that management objectives are being met.

Natural disturbance is an important process within most ecosystems. The plant communities present at any given point in time and space have developed in response to particular physical and biological factors, including the history of natural and human disturbance at that location. Active management may be required to reintroduce natural disturbance, such as fire, or to minimize socially unacceptable impacts, such as hazardous fuel loadings that have been created as a result of past fire suppression activities.

**Key Components of Ecosystem Management**

- Develop a shared vision of the desired ecosystem condition that takes into account existing social and economic conditions in the ecosystem, and identify ways in which all parties can contribute to, and benefit from, achieving ecosystem goals.
- Develop coordinated approaches among federal agencies to accomplish ecosystem objectives, collaborating on a continuous basis with state, local and tribal governments, and other stakeholders to address mutual concerns.
- Use ecological approaches that restore or maintain the biological diversity and sustainability of the ecosystem.
- Support actions that incorporate sustained economic, sociocultural, and community goals.
- Respect and ensure private property rights and work cooperatively with private landowners to accomplish shared goals.
- Recognize that ecosystems and institutions are complex, dynamic, characteristically heterogeneous over space and time, and constantly changing.
- Use an adaptive approach to management to achieve desired goals and a new understanding of ecosystems.
- Integrate the best science available into the decision-making process, while continuing scientific research to improve the knowledge base.
- Establish baseline conditions for ecosystem functioning and sustainability against which change can be measured; monitor and evaluate actions to determine if goals and objectives are being achieved.

*President's Ecosystem Management Task Force, 1995. Cited in Leslie, et al., 1996. Environmental Conservation Program, Enclosure 6, Ecosystem Management Principles and Guidelines, 1996. DODI 4715.3.*

Remediate the effects of natural disturbances only when it is essential for achieving other priority management objectives. For example, dead and damaged trees provide valuable wildlife habitat, as does downed wood. Dead trees within the Natural Habitat Preserve MEA should be left alone. Leave dead trees, snags, and logs in Natural Habitat Management and Natural Resources Multiple Use MEAs and other areas of the Base for wildlife use if they do not pose a hazard to public safety or facilities. Dispose of trees that fall into roadways or other developed areas in adjacent natural areas wherever possible. Fallen and standing snags provide important food and habitat for various species of birds, mammals, invertebrates, and fungi. Downed trees with heavy infestations of bark beetles or other insect pests may require special handling to control the infestation and protect forest health.

As much as possible, use management approaches that best mimic natural disturbance factors, such as fire and, in some cases, selective grazing and manual or mechanical removal of vegetation. Fire, for example, was a natural disturbance factor that maintained longleaf pine forests in Georgia. Reintroduction of fire may be required to restore such communities.

Existing forest communities on Base are largely self-sustaining. Therefore, take a "hands off" approach to management within the Natural Habitat Preserve MEA and, to a lesser extent, within the large eastern and southern core areas of the Natural Habitat Management MEA, except when natural factors such as pests or management goals such as fire hazard reduction require more active management.

Modify forest management practices as needed to support the designated management prescriptions for different MEAs. In general, limit physical disturbance of natural forest areas, such as mowing, trimming or clearing to the minimum necessary to meet natural resource management objectives consistent with the Base mission.

Use native species plantings for ornamental and landscaping purposes whenever possible. Transportation of native trees from areas slated for development (Development Preserve MEA) should be encouraged. Conduct transplanting only by, or under the direct supervision of, the Natural Resources staff.

Consider introduction of exotic species only when there is no practical native species alternative, and only within the Urban MEA or adjacent to roads or parking lots in other areas. Only non-invasive exotics shall be planted. Avoid introduction of exotics into the Natural Habitat Preserve and Natural Habitat MEAs.

To the extent that Base budgets allow, implement reforestation activities in disturbed areas that do not need to remain cleared of vegetation. Revegetation practices should be consistent with security and fire management guidelines.

In the forest areas within the Development Reserve MEA, emphasize management for aesthetic and wildlife values in the short-term, and on maintaining commercial value and harvest potential of timber resources in the long term. Harvest these areas prior to development to generate income whenever small lot timber sales are commercially feasible. In addition, consider these stands as a priority source when young trees are desired for transplanting into landscaped areas on improved or semi-improved grounds. Even within areas planned for development, small stands should remain to provide visual relief, shade and habitat for urban wildlife. Some small stands adjacent to the Development Reserve MEA areas are specifically included in the Natural Habitat Management MEA to preserve them for this purpose.

Manage for aesthetics, recreational use, and wildlife habitat within the Natural Resource Multiple Use and Intensive Recreation and Training MEAs. Integrate natural resources management with the goals of improved force readiness and mission effectiveness.

Avoid stand conversion and intensive management in areas likely to be impacted by development (i.e., within the Development Preserve MEA). Manage trees and other natural resources for mission effectiveness and aircraft safety in the BASH Reduction MEA.

Maintain forest health and promote aesthetic values in existing forest stands that are adjacent to residential areas or primary outdoor recreational areas.

Emphasize natural revegetation of disturbed areas, except when replanting is required as part of a critical habitat restoration or hazard remediation project (e.g., revegetating any eroded banks that are depositing sediment into tributary streams of Duck Lake would best be accomplished by replanting and not by relying solely on natural vegetation).

Perform landscaping in the urban areas of the Base, including the establishment of trees, shrubs, and other vegetation with native

wildlife in mind. The use of native plant species, particularly those species that provide food and cover for birds and small mammals during the winter months, is preferred.


Natural landscapes are often heterogeneous, with a mixture of different vegetation types and age classes. Such vegetation diversity across the landscape may be important to maintaining natural biodiversity. Within hardwood forests, for example, maintaining a landscape mosaic of hardwood stands with different age structures or size structures benefits wildlife populations by providing for sustained mast production (i.e., production of acorns and other seeds, nuts and fruits), vertical diversity, and recruitment in the local landscape. Retaining a mix of snags and dead and downed woody material in more mature stands provides for diversity in wildlife habitats and increases the number of wildlife species that can be supported at viable population levels.

Construction of new communication towers can create a potentially significant impact on migratory birds. When constructing new towers, consider USFWS interim guidelines on communication tower siting, construction, operation, and decommissioning (see Appendix D) in concert with the military mission and other regulations.

## Pest Management / BASH Program

Pest management at Robins AFB is implemented under the *Pest Management Plan*. Control programs are always planned to make use of integrated pest management (IPM) whenever possible. IPM emphasizes the use of biological, cultural, and mechanical methods for controlling pests. Controlling habitat, removing food sources, and exclusion from buildings help reduce the use of chemicals. Pesticide use has been reduced by over 80% since 1993. Other IPM tools implemented are planting trees less susceptible to insects and disease and promoting education of pest control techniques.

Bird and other wildlife hazards in the BASH Reduction MEA are reduced through implementation of the Base *BASH Plan*. This plan is based on BASH program guidelines contained in AFI 91-202, *USAF Mishap Prevention Program* and AFPAM 91-212, *BASH Management Techniques*.

## BASH Management

- The most significant hazards posed by wildlife to aircraft at Robins are those caused by: 1) predictable movements of large flocks of blackbirds, particularly from Jul-Feb; 2) nomadic travels of small flocks of Canada geese, especially during late summer and fall; 3) activities of bird species such as meadowlarks and mourning doves that live and/or forage on the airfield; and 4) nocturnal foraging activities of white-tailed deer and feral hogs. These hazards, as well as management strategies, are described in detail in BASH Plan.
- The principal means of controlling these hazards is through habitat management. Accordingly, the height of the grass on the airfield is maintained in the 7-14 inch range, areas on the airfield where water pools are filled, bare spots are seeded with grass, and the possibility of replacing the airfield's dominant grass species (bahia) with a species that is less attractive to wildlife is being evaluated. The two forested wetlands south of the runway and north of Second Street provide ideal cover for large mammals such as hog, deer, and coyote, as well as roosting sites for birds. Management options for reducing this hazard include erecting a fence between the runway and the wetlands, removing the vegetative cover, or filling the wetlands. These options need to be thoroughly evaluated.
- Scare tools are utilized to drive wildlife off the airfield. These tools include propane cannons, distress tapes, pyrotechnics, and shell crackers. Because scare tactics lose effectiveness over time without reinforcement, lethal measures must occasionally be employed, particularly for the control of blackbirds. A team approach involving Base entomology staff, environmental personnel, members of the flying units, and members of Base operations is used to implement scare and lethal control tactics
- The most effective means of keeping large mammals such as deer and hogs off the airfield is by completing the fence around the field. This project is underway. At present, the most effective alternative is the use of traps, extended hunting seasons for hog control in the forest east of the airfield, and, if all else fails, spotlighting and shooting these animals (with DNR's permission) at night.
- Canada geese usually do not visit the airfield. The hazard posed by these birds occurs when they fly through aircraft flight routes on their way to Base lakes, especially Scout Lake. Robins has worked with the USDA to have geese on Base captured and relocated to other lakes around the state. This is not a long-term solution. The best solution to this problem is to reduce the attractiveness of Scout Lake to geese via habitat alterations. This includes reducing the amount of turfgrass along the shore that they can feed on by planting shrubs and trees, and installing fencing if necessary. Base residents should not feed these birds, as this encourages their concentrations at the lakes. Other control options include spraying grazing deterrents on turf areas, and using dogs to frighten the birds. Scare tactics have not been very effective in frightening geese away from Scout Lake, because the birds often just take to the water or fly to the other end of the lake.
- Standard control tactics are not effective in some cases, and the best solution for avoiding bird strikes may simply be to not fly during periods of high risk. This is especially true during the periods of sunrise and sunset in winter when large concentrations of blackbirds form.
- The best way to avoid strikes is to develop a thorough understanding of annual, seasonal, and daily wildlife abundance, diversity, and movement patterns on, and adjacent to the airfield. Studies need to be conducted to quantify these parameters.

## Grounds Maintenance

The following implementation measures provide guidance for maintenance of improved, semi-improved, and unimproved grounds through the use of the Soil Conservation Service (SCS) and existing Air Force standards and specifications. The goal is to manage grounds in a manner that will optimize protection of existing ecosystems and contribute to biodiversity.

### *Reduce Frequency of Mowing*

The acreage of grassland and undeveloped forest that is mowed has been significantly reduced, and the frequency of mowing for some of these areas has also been reduced. In many cases, the timing of these mowing efforts has been altered so that it now occurs in late summer or fall, thereby protecting nesting areas for quail and other ground nesting birds.

Further evaluate existing turf areas to identify sites that could be mowed less frequently without interfering with their primary use or creating significant problems with aesthetics (visual impacts). Certain areas within the Intensive Recreation's MEA, the rough area on the golf course, for example, might be suitable candidates for reduced frequency of mowing. Other areas, such as putting greens and certain athletic fields require frequent mowing to satisfy primary use requirements.

Develop and implement a pilot program of reduced mowing frequency for the existing turf areas determined to be most suitable. Monitor results to determine effectiveness in achieving the objective without significant adverse impacts on primary uses or visual resources.

### *Convert Maintained Grounds*

Convert improved grounds to semi-improved or unimproved grounds, and convert semi-improved grounds to unimproved grounds. Robins AFB contains approximately 1,788 acres of improved lands, 1,476 acres of semi-improved lands and 3,120 acres of unimproved land. Listed below are some implementation methods for converting improved land to semi-improved and unimproved land.

Plant trees, shrubs and ground covers for permanent cover in improved areas:

1. When native trees are desired, consider transplanting trees from stands located in the Development Reserve MEA that are subject to future removal.
2. Emphasize the use of more durable native species rather than non-native ornamental plant species.

Ground covers include a wide range of low-growing plants planted together in considerable numbers to cover large areas of the landscape. Ground covers grow more slowly than grasses, and weeds are likely to compete, especially in the first year. Maintenance is needed to ensure survival. Do not use ground covers unless proper maintenance is planned. Maintain mulch at 3-inch thickness until the plants provide adequate cover.

Fall planting is encouraged because the need for constant watering is reduced and plants have time to establish new roots before hot weather.

Plant native grasses and wildflowers in desired areas. Wildflowers have been established on one of the landfills. Continuing efforts will be made to return more maintained landscape acreage to its natural state. The most suitable areas are sites located in the Nature Resources Multiple Use and Intensive Recreation, although some native wildflower planting might be appropriate for the Urban Development MEA as well.

## People Resource Management Implementation

***Primary Management Goal***

- Provide outdoor recreation opportunities that promote the mental, physical, and social well-being of Base personnel, and minimize impacts on sensitive natural resources.

The overall goal of this management area is to maximize the use of the extensive natural resources on the Base for outdoor recreation and natural resource education. As such, many of the implementation measures are synonymous with the management objectives.

## Recreation Area Maintenance / Development

Opportunities exist for expanding, renovating, and relocating outdoor recreation facilities to meet Base personnel outdoor recreation needs and enhance quality of life, particularly in the Intensive Recreation MEA.

Routinely maintain the existing nature trail near Luna Lake and the new trail at the longleaf pine restoration site. Explore opportunities for the development of other interpretative nature trails that take advantage of the unique natural areas on the Base.

Consider a canoe trail for Horse Creek. The trail could be constructed with limited channel clearing and creation of landing areas.

Consider designating and developing bicycle trails in the cantonment area or modify existing jogging trails to accommodate bicycles. Evaluate and extend the existing jogging path to connect Duck Lake and Scout Lake and the Base housing area. Investigate the Rails to Trails concept for converting the old rail line to a multi-use recreation trail. Evaluate development of a bicycle/walking trail along Hannah Road between the JSTARS area and the dormitories.

Promote family camping facilities and maintain and enhance fisheries through the fish and watercourse management implementation measures described previously. Areas open to fishing and the Memorandum of Understanding (MOU) for hunting and fishing regulation enforcement is provided in Appendix D.

Promote new picnic areas in the cantonment area to reduce over-use of existing facilities.

Regulate the use of all-terrain vehicles (ATVs) and other off-road vehicles to prevent damage to natural resources. Policies regarding ATV use are contained in RAFBI 32-7064 (Appendix D).

Recreation use should be consistent with natural resource management practices and other land uses. Reference the MEAs and Base land use maps to facilitate compliance with this goal.

Modify the existing outdoor recreation facility inventory to include planning for future facilities. Update the 1998 *Outdoor Recreational Facility Mapping* as necessary.

## Natural Resource Education

Improve, retain and develop habitat for watchable wildlife by selecting plants suitable for use in landscaping of urban areas, managing existing habitat by changing the way grounds are maintained, and by providing educational programs.

Participate in *Partners in Flight*, *Partners in Amphibian and Reptile Conservation*, and *Watchable Wildlife* to aid in conservation efforts and to facilitate learning about wildlife, habitat needs, and resource conservation. Promote

participation and transfer learning opportunities to Base personnel and the public.

Implement youth programs for hunting or fishing safety, or other activities such as fishing rodeos or parent/child events. Educational activities can coincide with national events such as National Hunting and Fishing Day, Earth Day, or National Arbor Day.

Provide informative materials about natural resources and management practices to the Base newspaper, the Nature Center, and local media through the Public Affairs Office.

Encourage volunteer participation in various aspects of natural resource management on the Base and arrange cooperative projects with public and government conservation groups.

## Program Management Implementation

**Primary Management Goal**

- Encourage better utilization and management of Base natural resources consistent with the Air Force mission.
- Use the Geographic Information System (GIS) to facilitate environmental management, and the decision-making process.

Better utilization and management of Base natural resources consistent with the Air Force mission is the principal programmatic goal of integrated natural resource program management at Robins AFB. A key tool for achieving this goal is the Base GIS. The GIS provides a focal point for the integration of natural resources management and comprehensive planning as well as other interdisciplinary management activities on the Base. Effective program implementation relies on the following actions.

## Coordination / Communication

Promote the continued use of MEAs for integrating natural resource management goals with land development activities. Define compatible and incompatible development activities in the context of MEA-specific goals and objectives.

Continue communication between natural resource and civil engineering personnel as a standard operating procedure in interdisciplinary Base planning decisions through regular meetings to discuss needs and concerns, and review of plans, specifications, or other documents such as AF Form 813.

Review and coordinate management strategies with cooperating local, state, and federal agencies prior to their implementation and maintain open communications with various conservation and natural resources organizations and agencies to obtain technical input and assistance.

## GIS Utilization

Maintain an updated GIS natural resources database and updated resource maps.

Provide Base personnel access to the GIS natural resource database and mapping for use in planning and decision-making.

Use the GIS to provide public access to the current INRMP to facilitate education and public awareness of the natural resources program.

## Program Assessment

Review the INRMP annually to monitor program progress and to make any necessary plan modifications. Obtain approvals for necessary revisions.

Incorporate outside assessment findings such as results of the Environmental Compliance Assessment and Management Program (ECAMP) review.

Update the comprehensive INRMP at 5-year intervals.

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**Agricultural Outleasing** – The use of DoD lands under a lease to an agency, organization, or person for growing crops or grazing animals.

**Best Management Practices (BMPs)** – Resource management decisions that are based on the latest professional and technical standards for the protection, enhancement, and rehabilitation of natural and cultural resources.

**Biodiversity** – The variety of life forms and processes and the environment in which they occur. Biodiversity includes the number and variety of living organisms, the genetic differences among them, the communities and ecosystems in which they occur, and the ecological and evolutionary processes that keep them functioning, yet ever changing and adapting.

**Candidate Species** – Any species, plant or animal, which is being considered for listing as threatened or endangered by the U.S. Department of the Interior.

**Commercial Forest Land** – Land under management capable of producing at least 20 cubic feet of merchantable timber per acre a year. It must be accessible and programmed for silvicultural prescriptions. The smallest area for this classification is 5 acres. Roadside, streamside, and shelterbelt strips of timber must have or be capable of producing a crown width of at least 120 cubic feet to be classified as a commercial forest.

**Conservation** – Planned management, use, and protection of natural and cultural resources to provide sustainable use and continued benefit for present and future generations. Also the prevention of exploitation, destruction, waste, and/or neglect or natural and cultural resources.

**Cooperative Agreement** – A written agreement between an AF installation and one or more outside agencies (Federal, state, or local) that coordinates planning strategies. It is a vehicle for obtaining assistance in developing natural resources programs.

**Critical Habitat** – An air, land, or water area (excluding existing synthetic structures or settlements that are not necessary to the survival and recovery of a listed species) and constituents thereof that the USFWS has designated as essential to the survival and recovery of an endangered or threatened species or a distinct segment of its population.

**Cultural Resources** – Buildings, structures, sites, districts, and objects eligible for or included in the National Register of Historic Places; "cultural items" as defined in 25 U.S.C. 3001 (reference (u)); American Indian, Eskimo, Aleut, or Native Hawaiian sacred sites for which access is protected under 42 U.S.C. 1996 (reference (d)); "archeological resources" as defined by Section 470 aa-11 of 16 U.S.C. (reference (h)); and "archeological artifact collections and associated records" defined under 36 CFR 79 (reference (e)).

**Ecosystem** – A dynamic and natural complex of living organisms interacting with each other and with their associated non-living environment.

**Ecosystem Management** – An approach to natural resources management that focuses on the interrelationships of ecological processes linking soils, plants, animals, minerals, climate, water, and topography. Managers view such processes as a living system that affects and responds to human activity beyond traditional commodity and amenity uses. They also acknowledge the importance of ecosystem services such as water conservation, oxygen recharge, and nutrient recycling.

**Endangered Species** – Any plant or animal listed as endangered by the Federal Government pursuant to the Endangered Species Act.

**Exotic Species** – Any plant or animal not native to a region, state, or country. (This definition excludes certain game species that have become established, such as pheasants).

**Fish** – Fresh and salt water fin-fish, other aquatic vertebrate organisms, and crustaceans and mollusks.

**Floodplains** – Lowland or flat areas adjoining inland and coastal waters.

**Forest Land** – Land on which forest tress of various size constitute at least 10 percent of the area. This category includes open land that is capable of supporting trees and is planned for forest regeneration and management.

**Forest Management** – Developing, conserving, and protecting forest resources to ensure that they provide sustained yield and multiple use.

**Game** – Any species of fish or wildlife for which state or federal laws and regulations prescribe hunting seasons or bag and creel limits.

**Habitat** – An area that provides the environmental elements of air, water, food, cover, and space necessary for a given species to survive and reproduce.

**Highly Erodible Soils** – Soils that, because of their physical properties or slope, the US Department of Agriculture, Natural Resources Conservation Service, identifies as being highly susceptible to wind or water erosion.

**Improved Grounds** – Grounds on which personnel annually plan and perform intensive maintenance activities. These are developed areas of an installation that have lawns and landscape plantings that require intensive maintenance. They usually include the cantonment, parade grounds, drill fields, athletic areas, golf courses (excluding roughs), cemeteries, and housing areas.

**Integrated Cultural Resources Management Plant (ICRMP)** – A plan that defines the process for the management of cultural resources on DoD installations.

**Integrated Natural Resources Management Plan (INRMP)** – A natural resources management plan based on ecosystem management that shows the interrelationships of the individual component plans as well as mission and land use activities affecting the basic land management plans.

**Integrated Pest Management (IPM)** – A planned program incorporating continuous monitoring, education, record-keeping, and communication to prevent pests and disease vectors from causing unacceptable damage to operations, people, property, material, or the environment. IPM includes methods such as habitat modification, biological control, genetic control, cultural methods, mechanical control, physical control, regulatory control, and the judicious use of least-hazardous pesticides.

**Land Management Unit** – The smallest land management division that planners use in developing specific strategies to accomplish natural resources management goals. Land management units may correspond to grazing units on agricultural outleased lands, stands or compartments on commercial forest lands, various types of improved grounds (for example, athletic fields, parks, yards in family housing, or landscaped areas around administrative buildings), or identifiable semi-improved grounds (for example, airfield areas, utility rights-of-way, or roadside areas).

**Land-Use Regulation** – A document that prescribes the specific technical actions or land use and restrictions with which lessees, permittees, or contractors must comply. It derives from the grazing or cropland management plan and forms a part of all outleases, land use permits, and other contracts.

**Mitigation** – Lessening the adverse effects an undertaking may cause relative to natural or cultural resources. Mitigation can include limiting the magnitude of the action; repairing, rehabilitating, or restoring the affected resource; avoiding the effect altogether; reducing or eliminating the effect over time by preservation and maintenance operations during the life of the action; and/or compensating for the effect by providing substitute resources or environments.

**Multiple-Use** – The integrated, coordinated, and compatible use of various natural resources to derive the best benefit while perpetuating and protecting those resources.

**Multiple-Use and Sustained Yield Management** – The care and use of natural resources so as to best serve the present and future needs of the United States and its people without impairing the productivity of the land and water.

**National Register of Historic Places (NRHP)** – The official Federal list of sites, districts, buildings, structures, and objects worthy of preservation consideration because of significance in American history, architecture, archeology, engineering, or culture. Significance may be local, State, or national in scope. National Register eligibility criteria are published in 36 CFR 60 (reference (e)).

**Native Americans** – American Indians, Eskimos, Aleuts, and Native Hawaiians.

**Natural Resources** – All elements of nature and their environments of soil, air, and water. Natural Resources consist of two general types, as follows:

a. Earth Resources – Nonliving resources such as minerals and soil components.

b. Biological Resources – Living resources such as plants and animals.

**Planning Level Survey and/or Inventory of Biological, Cultural, or Earth Resources** – An inventory of "sensitive and significant resources" that must be identified to integrate legal and stewardship requirements with military requirements so that defense preparedness is maintained.

**Prime Farmland** – Land that has the best combination of chemical and physical characteristics for producing food, feed, forage, fiber, and oil-seed crops and is also available or potentially available for these uses. It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops under modern farming methods. Existing pasture land, rangeland, forest land, and other land not in an urban buildup condition is considered eligible for designation as prime farmland, providing it meets the other criteria.

**Recreation Carrying Capacity** – The level of recreational use that an area can sustain without damage to the environment.

**Reforestation** – The renewal or regeneration of a forest by natural or artificial means.

**Rotation Age** – The planned number of years between the regeneration of a forest stand and its final cutting at a specified stage of maturity.

**Semi-Improved Grounds** – Grounds where personnel perform periodic maintenance primarily for operational and aesthetic reasons (such as erosion and dust control, bird control, and visual clear zones). These usually include grounds adjacent to runways, taxiways, and aprons; runway clear zones; lateral safety zones; rifle and pistol ranges; picnic areas; ammunition storage areas; antenna facilities; and golf course roughs.

**Sensitive Resources** – "Resources" identified as "highly responsive or susceptible to modification by external agents or influences."

**Significant Resources** – "Resources" identified as "having special importance," or as "having or likely to have more influence on a particular aspect of the environment than other components."

**Silviculture** – A branch of forestry dealing with the development and care of forests.

**Stewardship** – The management of resources entrusted to one's care in a way that preserves and enhances the resources and their benefits for present and future generations.

**Sustainable Yield** – Managing a renewable natural resource to provide an annual or periodic yield of goods, services, and direct and indirect benefits, into perpetuity. That may include, but is not limited to, maintaining economic benefits, ecological processes and functions, and biodiversity.

**Threatened Species** – Those federally listed species of flora and fauna that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range and that have been designated for special protection and management pursuant to the Endangered Species Act.

**Timber Management** – The application of silviculture knowledge and prescriptions to forest lands within, economic and environmental constraints, to produce a sustained yield of forest products.

**Timber Stand Improvement (TSI)** – Silvicultural treatments applied to existing stands to improve their quality, composition, condition, or rate of growth (such as pruning, thinning, releasing, and prescribed burning).

**Tribe** – A Federally-recognized tribe or other Federally-recognized Native American group or organization.

**Unimproved Grounds** – Grounds normally managed by the natural resources staff on an installation or in firing ranges or annexes in support of the AF mission and to achieve integrated resources goals defined in the INRMP. All grounds not expressly defined as improved or semi-improved are unimproved. Unimproved grounds include weapons firing and bombing ranges; forest lands; croplands and grazing lands; grasslands or ranges; lakes, ponds, and wetlands; and areas in the airfield beyond the safety zones.

**Urban Forests** – Planted or remnant native tree species within urbanized areas such as parks, tree-lined residential streets, scattered tracts of undisturbed woodlands, and cantonment areas.

**Watchable Wildlife Areas** – Areas identified under the Watchable Wildlife Program as suitable for passive recreational areas such as bird watching, nature study, and other nonconsumptive uses of wildlife resources.

**Wetlands** – Areas inundated or saturated by surface or ground water at a frequency and a duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

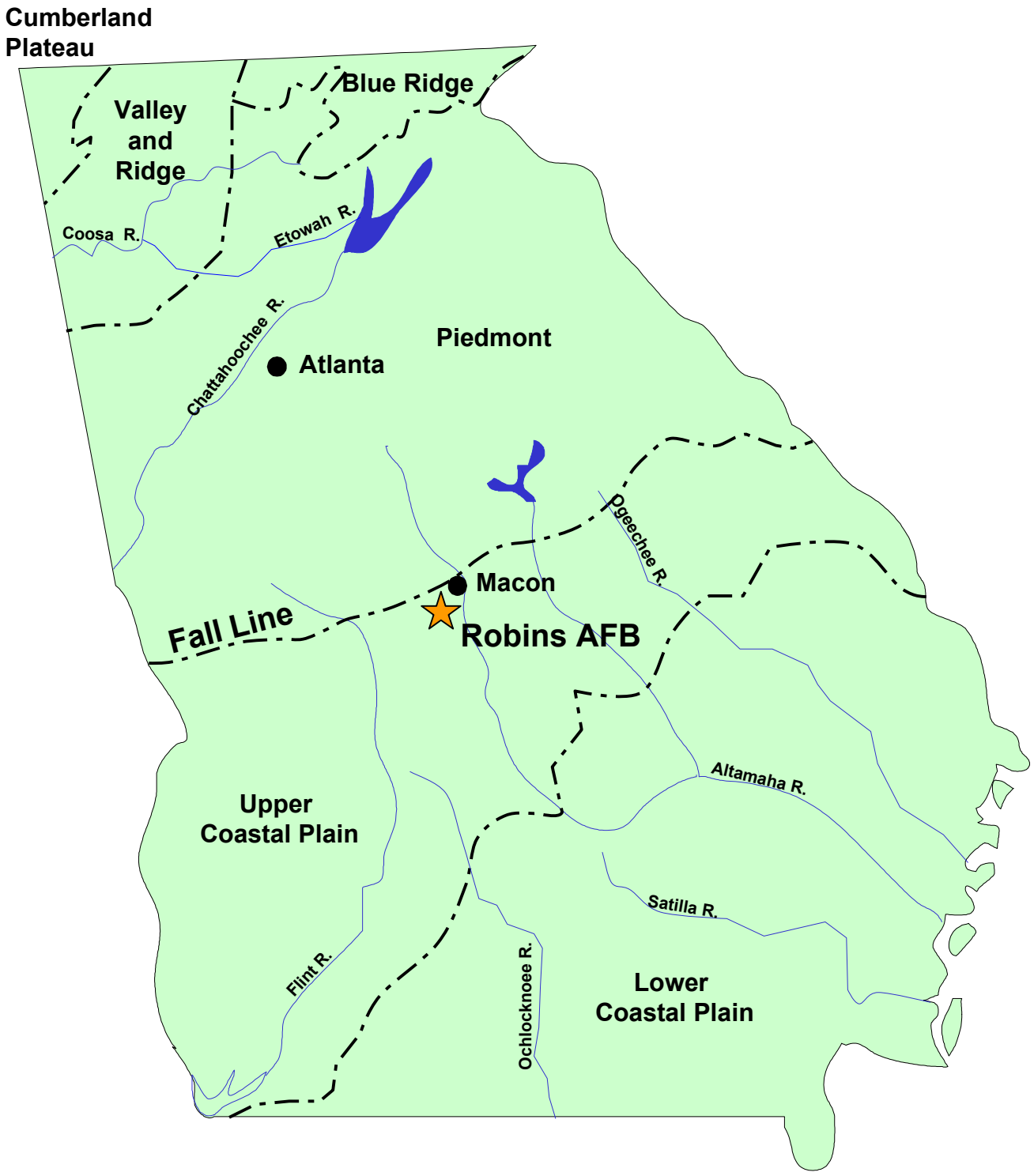
**Wildlife** – All undomesticated species of animals.

# Appendix A

## Resource Maps

# Robins Air Force Base

Figure 1 Physiographic Provinces of Georgia



# Appendix B

## Laws, Regulations, and Directives

# Laws, Regulations and Directives

The Integrated Natural Resources Management Plan for Robins Air Force Base is the primary driver for enforcement of natural resources laws and regulations at the Base. Other related laws and regulations applicable to the natural resource management at Robins AFB are defined below.

### Department of Defense

- Department of Defense Directive (DODD) 4700.4, Natural Resources Management Program (24 January 1989)
- DODD 7310.5, Accounting for Production and Sale of Timber Products (25 January 1988)
- Department of Defense Instruction (DODI) 4715.3, Environmental Conservation Program (3 May 1996)

### Air Force

- Air Force Policy Directive (AFPD) 32-70, Environmental Quality
- Air Force Instruction (AFI) 32-7064, Integrated Natural Resources Management Plan
- AFI 32-7061, Environmental Impact Analysis Process
- AFI 35-202, Environmental Impact Analysis

### All Resources

- The Sikes Act (USC Title 16, Chapter 5C, Subchapter I, Conservation Programs on Military Installations)
- National Environmental Policy Act (NEPA) of 1969 (42 USC 4321-4370a)
- CEQ Final Regulations for Implementing NEPA (30 CFR 1500-1508, November 29, 1978)
- Final CEQ Regulations (40 CFR 6)

### Floodplains

- Executive Order 11988, Floodplain Management
- Section 10 of the Rivers and Harbors Act (33 USC 401-413)

### Stormwater Management and Erosion and Sediment Control

- Section 313 of the Federal Clean Water Act of 1977 (33 USC 1250-1376)
- Georgia Erosion and Sedimentation Act of 1975 (O.C.G.A. 12-7-1 *et. seq.)*

### Fish and Wildlife

- Fish and Wildlife Coordination Act (16 USC 661-666)
- Executive Order 12962, Recreational Fisheries
- Migratory Bird Treaty Act (16 USC 703 *et. seq.*)

### Plants

- Management of Undesirable Plants on Federal Lands (7 USC 2814)
- Executive Order 13112, Invasive Species

### Wetlands

- Clean Water Act (33 USC 1251 *et. seq.*)
- Executive Order 11990, Protection of Wetlands
- Sections 9 and 10 of the Rivers and Harbors Act (33 USC 401 *et. seq.*)
- Sections 401-404 of the Clean Water Act of 1977, as amended (33 USC 1251-1376)

### Threatened and Endangered Species

- Endangered Species Act of 1973, as amended (16 USC 1531-1543)

### Land Management and Recreation

- Multi-Use Sustained Yield Act (16 USC 528 et. seq.)
- Executive Order 11989, Policy for Off-Road Vehicle Use on Federal Land

# Appendix C

## Plant and Animal Species Lists

**TABLE C-1**

**ANIMAL SPECIES RECORDED AT ROBINS AFB**

| Common Name | Scientific Name |
|---|---|
| **Amphibians** | |
| Barking Treefrog | *Hyla gratiosa* |
| Bird-voiced Treefrog | *Hyla avivoca* |
| Bronze Frog | *Rana clamitans clamitans* |
| Bullfrog | *Rana catesbeiana* |
| Duskey Salamander | *Desmnognathus fuscus* |
| Fowler's Toad | *Bufo woodhousii fowleri* |
| Gray Treefrog | *Hyla versicolor* |
| Green Frog | *Rana clamitans melanota* |
| Green Treefrog | *Hyla cinerea* |
| Marbled Salamander | *Ambystoma opacum* |
| Ornate Chorus Frog | *Pseudacris ornata* |
| Pig Frog | *Rana grylio* |
| Southern Chorus Frog | *Pseudacris nigrita nigrita* |
| Southern Cricket Frog | *Acris gryllus* |
| Southern Leopard Frog | *Rana utricularia utricularia* |
| Southern Toad | *Bufo terrestris* |
| Spotted Salamander | *Ambystoma maculatum* |
| Spring Peeper | *Pseudacris crucifer crucifer* |
| **Reptiles** | |
| American Alligator | *Alligator mississippiensis* |
| Banded Water Snake | *Nerodia fasciata fasciata* |
| Barbours Map Turtle | *Graptemys barbouri* |
| Brown Water Snake | *Natrix taxispilota* |
| Chicken Turtle | *Deirochelys reticularia* |
| Common Snapping Turtle | *Chelydra serpentina* |
| Eastern Box Turtle | *Terrapene carolina* |
| Eastern Cottonmouth | *Agkistrodon piscivorus* |
| Eastern Hognose Snake | *Heterodon platyrhinos* |
| Eastern Kingsnake | *Lampropeltis getulus* |
| Eastern Mud Turtle | *Kinosternon subrubrum subrubrum* |
| Eastern Painted Turtle | *Chrysemys picta* |
| Five-lined skink | *Eumeces fasciatus* |
| Green Anole | *Anolis carolinensis* |
| Loggerhead Musk Turtle | *Sternotherus minor* |
| Northern Black Racer | *Coluber constrictor* |
| Six-lined Racerunner | *Cnemigophorus sexlineatus* |
| Stinkpot | *Sternotherus odoratus* |
| Southern Black Racer | *Coluber constrictor priapus* |

**TABLE C-1**
**(continued)**
**ANIMAL SPECIES RECORDED AT ROBINS AFB**

| | |
|---|---|
| Southern Fence Lizard | *Sceloporus undulatus undulatus* |
| Timber Rattlesnake | *Crotalus horridus* |
| Yellowbelly Slider | *Trachemys scripta seripta* |
| Yellow-bellied Turtle | *Chrysemys scripta* |

**Mammals**

| | |
|---|---|
| Beaver | *Castor canadensis* |
| Black Bear | *Ursus americanus* |
| Black Rat | *Rattus rattus* |
| Bobcat | *Felis rufus* |
| Coyote | *Canis latrans* |
| Eastern Chipmunk | *Tamias striatus* |
| Eastern Cottontail | *Sylvilagus floridanus* |
| Eastern Fox Squirrel | *Sciurus niger* |
| Eastern Gray Squirrel | *Sciurus carolinensis* |
| Eastern Mole | *Scalopus aquaticus* |
| Eastern Pipistrel | *Pipistrellus subflavus* |
| Eastern Wood Rat | *Neotomafloridana* |
| Evening Bat | *Mcticeius humeralis* |
| Feral Hog | *Sus scrofa* |
| Gray Fox | *Urocyon cinereoargenteus* |
| Hispid Cotton Rat | *Sigmodon hispidus* |
| House Cat | *Felis catcus* |
| House Mouse | *Mus musculus* |
| Least Shrew | *Cryptotis parva* |
| Little Brown Bat | *Myotis lucifugus* |
| Long-tailed Weasel | *Mustela frenata* |
| Mink | *Mustela vison* |
| Muskrat | *Ondatra zibethicus* |
| Norway Rat | *Rattus norvegicus* |
| Nutria | *Myocastor coypus* |
| Opossum | *Didelphis virginianus* |
| Pine Vole | *Pitymys pinetorum* |
| Raccoon | *Procyon lotor* |
| Red Bat | *Lasiurus borcails* |
| Red Fox | *Vulpes vulpes* |
| River Otter | *Lutra canadensis* |
| Short-tailed Shrew | *Blarina brevicauda* |
| Southeastern Pocket Gopher | *Geomys pinetis* |
| Southern Flying Squirrel | *Glaucomys volans* |
| Striped Skunk | *Mephitis mephitis* |
| Swamp Rabbit | *Sylvilagus aquaticus* |
| White-footed Mouse | *Peromyscus leucopus* |

**TABLE C-1**
**(continued)**
**ANIMAL SPECIES RECORDED AT ROBINS AFB**

| | |
|---|---|
| White-tailed Deer | *Odocoileus virginianus* |
| Wild Boar | *Sus scrofa* |

**Birds**

| | |
|---|---|
| Acadian Flycatcher | *Empidonax virescens* |
| American Black Duck | *Anas rubripes* |
| American Coot | *Fulica americana* |
| American Crow | *Corvus brachyrnynchos* |
| American Goldfinch | *Carduelis tristis* |
| American Kestrel | *Falco sparverius* |
| American Marsh Hawk | *Circus cyaneus* |
| American Robin | *Turdus migratorius* |
| American Woodcock | *Scolopax minor* |
| Bald Eagle | *Haliaeetus leucocephalus* |
| Bam Swallow | *Hirundo rustica* |
| Barred Owl | *Strix varia* |
| Belted Kingfisher | *Megaceryle aicyon* |
| Black-crowned Night Heron | *Nycticorax nycticorax* |
| Black Vulture | *Coragyps atratus* |
| Blue-gray Gnatcatcher | *Polioptila caerulea* |
| Blue Jay | *Cyanocitta cristata* |
| Bobwhite Quail | *Colinus virginianus* |
| Broad-winged Hawk | *Buteo platypterus* |
| Brown-headed Cowbird | *Molothrus ater* |
| Brown-headed Nuthatch | *Sitta pusilla* |
| Brown Thrasher | *Toxostoma rufum* |
| Canada Goose | *Branta canadensis* |
| Carolina Chickadee | *Parus carolinensis* |
| Carolina Wren | *Thryothorus ludovicianus* |
| Cattle Egret | *Bibulcus ibis* |
| Cedar Waxwing | *Bombycilla cedrorum* |
| Chimney Swift | *Chaetura pelagica* |
| Chipping Sparrow | *Spizella passerina* |
| Chuck-Wills-Widow | *Caprimulgus carolinensis* |
| Cliff Swallow | *Petrochelidon pyrrhonota* |
| Common Flicker | *Colaptes auratus* |
| Common Grackle | *Quiscalus quiscula* |
| Common Mallard | *Anas platyrhynchos* |
| Common Nighhawk | *Chordeiles minor* |
| Common Screech Owl | *Otus asio* |
| Common Snipe | *Capella gallinago* |
| Common Yellowthroat | *Geothlypis trichas* |
| Coopers Hawk | *Accipiter cooperii* |
| Crested Flycatcher | *Myiarchus crinitus* |

**TABLE C-1**
**(continued)**
**ANIMAL SPECIES RECORDED AT ROBINS AFB**

| | |
|---|---|
| Downy Woodpecker | *Picoides pubescens* |
| Eastern Bluebird | *Sialia sialis* |
| Eastern Kingbird | *Tyrannus tyrannus* |
| Eastern Meadowlark | *Sturnella magna* |
| Eastern Pewee | *Contopus virens* |
| Eastern Phoebe | *Sayornis phoebe* |
| European Starling | *Sturnus vulgaris* |
| Fish Crow | *Corvus ossifragus* |
| Gray Catbird | *Dumetella carolinensis* |
| Great Blue Heron | *Ardea nerodias* |
| Great Egret | *Casmerodius albus* |
| Great Horned Owl | *Bubo virginianus* |
| Great Yellowlegs | *Tringa melanoleuca* |
| Green Heron | *Butorides striatus* |
| Ground Dove | *Columbina passerina* |
| Hairy Woodpecker | *Picoides villosus* |
| Hermit Thrush | *Catharus guttatus* |
| Hooded Warbler | *Wilsonia citrina* |
| House Sparrow | *Passer domesticus* |
| Indigo Bunting | *Passerina cyanea* |
| Killdeer | *Charadrius vociferus* |
| Least Sandpiper | *Calidris minutilla* |
| Little Blue Heron | *Florida caerulea* |
| Loggerhead Shrike | *Lanius ludovicianus* |
| Louisiana Heron | *Hydranassa tricolor* |
| Magnolia Warbler | *Dendroica magnolia* |
| Mississippi Kite | *Ictinia mississippiensis* |
| Mourning Dove | *Zenaida macroura* |
| Northern Cardinal | *Cardinalis cardinalis* |
| Northern Junco | *Junco hyemalis* |
| Northern Mockingbird | *Mimus polyglottos* |
| Northern Parula Warbler | *Parula americana* |
| Northern Water-thrush | *Seiurus noveboracensis* |
| Pied-billed Grebe | *Podilymbus podiceps* |
| Pileated Woodpecker | *Dryocopus pileatus* |
| Pine Warbler | *Dendroica pinus* |
| Prairie Warbler | *Dendroica discolor* |
| Prothonotary Warbler | *Protonotaria citrea* |
| Purple Martin | *Progne subis* |
| Red-bellied Woodpecker | *Melanerpes carolinus* |
| Red-headed Woodpecker | *Melanerpes erythrocephalus* |
| Red-shouldered Hawk | *Buteo lineatus* |
| Red-tailed Hawk | *Buteo jamaicensis* |
| Red-winged Blackbird | *Agelaius phoeniceus* |
| Red-billed Gull | *Larus delawarensis* |
| Rock Dove (Pigeon) | *Columba livia* |

**TABLE C-1**
**(continued)**
**ANIMAL SPECIES RECORDED AT ROBINS AFB**

| | |
|---|---|
| Rough-winged Swallow | *Stelgidopteryx ruficollis* |
| Ruby-crowned Kinglet | *Regulus calendula* |
| Ruby-throated Hummingbird | *Archilochus colubris* |
| Rufus-sided Towhee | *Pipilo erythrophthalamus* |
| Savannah Sparrow | *Passerculus sandwichensis* |
| Scarlet Tanager | *Piranga olivacea* |
| Semipalmated Sandpiper | *Calidris pusilla* |
| Sharp-shinned Hawk | *Accipiter striatus* |
| Summer Tanager | *Piranga rubra* |
| Swamp Sparrow | *Melospiza georgiana* |
| Tufted Titmouse | *Parus bicolor* |
| Turkey Vulture | *Cathartes aura* |
| Whip-Poor-Will | *Caprimuigus vociferus* |
| White-eyed Vireo | *Vireo griseus* |
| White-throated Sparrow | *Zonotrichia albicollis* |
| Wild Turkey | *Meleagris gallopavo* |
| Wood Duck | *Aix sponsa* |
| Wood Thrush | *Hylocichia mustelina* |
| Yellow-bellied Sapsucker | *Sphyrapicus varius* |
| Yellow-billed Cuckoo | *Coccyzus ainericanus* |
| Yellow-breasted Chat | *Icteria virens* |
| Yellow-crowned Night Heron | *Nyctanassa violacca* |
| Yellow-rumped Warbler | *Dendroica coronata* |
| Yellow-throated Vireo | *Vireo flavifrons* |
| Yellow-throated Warbler | *Dendroica dominica* |

**Fish**

| | |
|---|---|
| American Eel | *Anguilla rostrata* |
| American Shad | *Alosa sapidissima* |
| Banded Pygmy Sunfish | *Elassoma zonatun* |
| Black Banded Darter | *Percina nigrofasciata* |
| Black Crappie | *Pomoxis nigromaculatus* |
| Bluegill | *Lepomis macrochirus* |
| Bluehead Chub | *Nocomis leptocephalus* |
| Bowfin | *Amia calva* |
| Brook Silverside | *Labidesthes sicculus* |
| Brown Bullhead | *Ictalurus nebulosus* |
| Chain Pickerel | *Esox niger* |
| Channel Catfish | *Ictalurus punctatus* |
| Christmas Darter | *Etheostoma hopkinsi* |
| Coastal Shiner | *Notropis petersoni* |
| Creek Chubsucker | *Erimyzon oblongus* |
| Dollar Sunfish | *Lepomis marginatus* |
| Dusky Shiner | *Notropis cummingsae* |

**TABLE C-1**
**(continued)**
**ANIMAL SPECIES RECORDED AT ROBINS AFB**

| | |
|---|---|
| European Carp | *Cyprinus carpio* |
| Flier | *Centrarchus macropterus* |
| Gizzard Shad | *Dorosoma cepedianum* |
| Golden Shiner | *Notemigonus crysoleucas* |
| Golden Topminnow | *Fundulus chrysotus* |
| Goldfish | *Carassius auratus* |
| Goldstripe Darter | *Etheostoma parvipinne* |
| Ironcolor Shiner | *Notropis chalybaeus* |
| Lake Chubsucker | *Erimyzon sucetta* |
| Largemouth Bass | *Micropterus salmoides* |
| Longnose Gar | *Lepisosteus osseus* |
| Mosquitofish | *Gambusia affinis* |
| Mud Sunfish | *Acantharchus pomotis* |
| Ocmulgee Shiner | *Notropis callisema* |
| Pinewood Darter | *Etheostoma inscriptum* |
| Pirate Perch | *Aphredoderus sayanus* |
| Pugnose Minnow | *Notropis emiliae* |
| Redbreast Sunfish | *Lepomis auritus* |
| Redear Sunfish | *Lepomis microlophus* |
| Redeye Bass | *Micropterus coosae* |
| Redeye Chub | *Hybopsis harperi* |
| Redfin Pickerel | *Esox americanus* |
| Sailfin Shiner | *Notropis hypselopterus* |
| Sawcheek Darter | *Etheostoma serriferum* |
| Sea Lamprey | *Petromyzon marinus* |
| Silver Redhorse | *Moxostoma anisurum* |
| Silvery Minnow | *Hybognathus nuchalis* |
| Snail Bullhead | *Ictalurus brunneus* |
| Speckled Madtom | *Noturus leptacanthus* |
| Spottail Shiner | *Notropis hudsonius* |
| Spotted Sucker | *Minytrema melanops* |
| Spotted Sunfish | *Lepomis punctatus* |
| Starhead Topminnow | *Fundulus notti* |
| Striped Bass | *Morone saxatilis* |
| Swamp Darter | *Etheostoma fusiforme* |
| Swamp Fish | *Chologaster cornuta* |
| Tadpole Madtom | *Noturus gyrinus* |
| Taillight Shiner | *Notropis maculatus* |
| Tesselated Darter | *Etheostoma olmstedi* |
| Threadfin Shad | *Dorosoma petenense* |
| Warmouth | *Lepomis gulosus* |
| White Bass | *Morone chrysops* |
| White Crappie | *Pomoxis annularis* |
| Yellow Bullhead | *Ameiurus natalis* |
| Yellow Perch | *Perca flavescens* |

Sources:

Earth Tech/Rust Environment & Infrastructure. March 2000. *Final: Threatened and Endangered Animal Species Survey for Warner Robins Air Logistics Center.*

Georgia Department of Natural Resources, Wildlife Resources Division, Georgia Natural Heritage Program. 1994 *A Rare Species and Natural Communities Survey at Robins Air Force Base, Georgia.*

U.S. Department of Agriculture, Soil Conservation Service. 1989. *Natural Resources Plan, Robins Air Force Base.* SCS, Athens, Georgia.

**TABLE C-2**

**PLANT SPECIES RECORDED AT ROBINS AFB**

| Common Name | Scientific Name |
|---|---|
| | **Grasses** |
| Arrowhead | *Sagittaria graminea* |
| Arrowhead | *Sagittaria latifolia* |
| Arrowleaf | *Sagittaria* sp |
| Bahia grass | *Paspalum notatum* |
| Barnyard grass | *Echinochloa crusgalli* |
| Beak rushes | *Rhynchospora* ssp |
| Beaked panicum | *Panicum anceps* |
| Black-seeded spikerush | *Eleocharis melanocarpa* |
| Bluestem | *Andropogon tenerum* |
| Broomsedge | *Andropogon virginicus* |
| Brown top millet | *Panicum ramosum* |
| Bulrush | *Scirpus* sp |
| Burreed | *Sparganium americanum* |
| Cane | *Arundinaria gigantea* |
| Carex | *Carex lurida* |
| Catchfly grass | *Leersia lenticularis* |
| Cattail | *Typha latifolia* |
| Centipede grass | *Eremochloa ophiuroides* |
| Cheat | *Bromus secaitinus* |
| Common bermuda | *Cynodon dactylon* |
| Common reed | *Phragmites australis* |
| Crabgrass | *Digitaria* sp |
| Creeping rush | *Juncus repens* |
| Fall panicum | *Panicum dichotomiflorum* |
| Fimbristylis | *Fimbristylis* sp |
| Florida paspalum | *Paspalum floridanum* |
| Foxtail | *Setaria* sp |
| Giant foxtail | *Setaria* sp |
| Johnson grass | *Sorghum halepense* |
| Juncus | *Juncus* sp |
| Little blue | *Andropogon stolonifer* |
| Little bluestem | *Andropogon scoparius* |
| Lovegrass | *Eragrostis* sp |
| Maidencane | *Panicum hemitomon* |
| Muhly | *Muhlenbergia capiliaris* |
| Needle & thread grass | *Stipa avenacea* |
| Pineywood dropseed grass | *Sporobolus junceus* |
| Plumegrass | *Erianthus giganteus* |
| Plumegrass | *Erianthus* sp |
| Purple lovegrass | *Eragrostis spectabilis* |

**TABLE C-2**
**(continued)**
**PLANT SPECIES RECORDED AT ROBINS AFB**

| | |
|---|---|
| Purpletop | *Tridens flavus* |
| Purpletop | *Tridens* sp |
| Quillwort-leaved arrowhead | *Sagittaria isoetiformis* |
| Robbin's spikerush | *Eleocharis robbinsii* |
| Rosette panicum | *Panicum* sp |
| Sedge | *Carex* sp |
| Sedge | *Cyperus* sp |
| Smutgrass | *Sporobolus poiretii* |
| Soft rush | *Juncus effusus* |
| Southern peat moss sedge | *Carex lonchocarpa* |
| Southern waterstargrass | *Heteranthera* sp |
| Spikerush | *Eleocharis* sp |
| Splitbeard grass | *Andropogon ternarius* |
| Sprangletop | *Leptochloa* sp |
| St. Augustine grass | *Stenotaphrum secundatum* |
| Switchgrass | *Panicum virgatum* |
| Umbrella grass | *Fuirena* sp |
| Vasey grass | *Paspalum urvillei* |
| Water millet | *Panicum gymnocarpon* |
| Whitetop grass | *Leersia* sp |
| Wire grass | *Aristida stricta* |
| Wool grass | *Scirpus cyperinus* |

**Forbs**

| | |
|---|---|
| Alligatorweed | *Alternanthera philoxeroides* |
| Arrow-vine smartweed | *Polygonum sagittatum* |
| Aquatic milkweed | *Asclepias perennis* |
| Aster | *Aster* ssp |
| Awned meadowbeauty | *Rhexia aristosa* |
| Bamboo-vine | *Smilax laurifolia* |
| Bedstraw | *Galium* sp |
| Bee-balm | *Monarda* sp (*may be M. citrodora*) |
| Bee-balm (mint) | *Pycnanthemum* sp |
| Beggarlice | *Desmodium cuspidatum* |
| Beggarticks | *Bidens* ssp |
| Bellflower | *Uvularia* sp |
| Bigflowered vetch | *Vicia angustifolia* |
| Black-eyed grass | *Sisyrinchium* sp |
| Blazing star | *Liatris elegans* |
| Blue-eyed grass | *Sisyrinchium* sp |
| Blue-star | *Amsonia tabernaemontana* |
| Bluet | *Hedyotis* sp |
| Bloodroot | *Sanguinaria canadensis* |
| Boltonia | *Boltonia asteroides* |

**TABLE C-2**
**(continued)**
**PLANT SPECIES RECORDED AT ROBINS AFB**

| | |
|---|---|
| Boykin's lobelia | *Lobelia boykinii* |
| Bracken fern | *Pteridium aquilinum* |
| Butterfly weed | *Asclepias tuberosa* |
| Butterfly pea | *Clitoria mariana* |
| Cardinal flower | *Lobelia cardinalis* |
| Catbriar | *Smilax bona-nox* |
| Chickweed | *Stellaria* sp |
| Christmas fern | *Polystichum acrostichoides* |
| Cinnamon fern | *Osmunda cinnamomea* |
| Clearweed | *Pilea pumila* |
| Climbing butterfly pea | *Centrosema virginianums* |
| Climbing hempweed | *Mikania scandens* |
| Coffee weed | *Cassia obtusifolia* |
| Common greenbriar | *Smilax rotundifolia* |
| Common lespedeza | *Lespedeza stipulacea* |
| Common smartweed | *Polygonum hydropiperoides* |
| Common yarrow | *Achillea millefolium* |
| Coral green | *Smilax walteri* |
| Coreopsis | *Coreopsis* ssp. |
| Cranesbill | *Geranium carolinianum* |
| Creeping lespedeza | *Lespedeza repens* |
| Crotalaria | *Crotalaria rotundifolia* |
| Croton | *Euphorbia maculata* |
| Dandelions | *Krigia dandelion* |
| Dandelions | *Krigia virginica* |
| Dayflower | *Commelina* sp. |
| Diodia | *Diodia virginiana* |
| Dock | *Rumex* ssp. |
| Dockleave smartweed | *Polygonum lapathifolium* |
| Dog-fennel | *Eupatorium capillifolium* |
| Dollarweed | *Rhynchosia reniformis* |
| Duckweed | *Lemna perpusilla* |
| Ebony spleenwort | *Asplenium platyneuron* |
| Elephant's foot | *Elephantopus carolinianus* |
| Evening promise | *Oenothera biennis* |
| Everlasting pea | *Lathyrus hirsutus* |
| False-nettle | *Boehmeria cylindrica* |
| False Solomon's-seal | *Smilacina racemosa* |
| Field goldenrod | *Solidago altissima* |
| Floating heart | *Nymphoides cordata* |
| Florida beggarlice | *Desmodium tortuosum* |
| Florida purslane | *Richardia scabra* |
| Flowering spurge | *Euphorbia corllata* |
| Gerardias (false foxglove) | *Agalinis* sp. |

**TABLE C-2**
**(continued)**
**PLANT SPECIES RECORDED AT ROBINS AFB**

| | |
|---|---|
| Goat's rue | *Tephrosia hispidula* (*or T. florida*) |
| Goldenrod | *Solidago* ssp. |
| Grape fern | *Botrychium* sp. |
| Green-eyes | *Berlandiera pumila* |
| Hairy dollarweed | *Rhynchosia tomentosa* |
| Hairy vetch | *Vicia* sp. (*may be V. caroliniana*) |
| Hairy vetch | *Vicia villosa* |
| Harper's wild ginger | *Hexastylis shuttleworthii var. Harperi* |
| Heal-all | *Prunella vulgaris* |
| Heart leaf (wild ginger) | *Hexastylis arifolia* |
| Hop clover | *Trifolium* sp. |
| Hosenettle | *Solanum caroliense* |
| Hydrolea | *Hydrolea quadrivalvis* |
| Indian pink | *Spigelia marilandica* |
| Interrupted fern | *Osmunda claytoniana* |
| Ironweed | *Veronia gigantea* |
| Ironweed | *Veronia glauca* |
| Japanese honeysuckle | *Lonicera japonica* |
| Jewel weed | *Impatiens capensis* |
| Lemon bacopa | *Bacopa caroliniana* |
| Lizard's-tail | *Saururus cernuus* |
| Marsh pink | *Sebatia* sp. |
| May pop | *Passiflora incarnata* |
| Meadow beauty | *Rhexia alifanus* |
| Meadow rue | *Thalictrum* sp |
| Milkpea (mildbean) | *Galactia minor* |
| Milkweed | *Asclepias* sp |
| Mint | *Mentha* ssp |
| Monkey-flower | *Mimulus ringens* |
| Mullein | *Verbascum thapsus* |
| Narrow-leaf coreopsis | *Coreopsis augustifolia* |
| Narrow-leaf sunflower | *Helianthus augustifolius* |
| Narrow-leaf verbena | *Verbena carnes* |
| Netted chain fern | *Woodwardia areolata* |
| Nettle-leaf sage | *Salvia urticifolia* |
| Nightshade | *Solanum nigrum* |
| Ocmulgee skullcap | *Scutellaria ocmulgee* |
| Oval lady's-tresses | *Spiranthes ovalis* |
| Pale meadowberry | *Rhexia mariana* |
| Partridge berry | *Mitchella repens* |
| Partridge pea | *Cassia fasciculata* |
| Partridge pea | *Cassia* sp. |
| Pencil flower | *Stylosanthes biflora* |

**TABLE C-2**
**(continued)**
**PLANT SPECIES RECORDED AT ROBINS AFB**

| | |
|---|---|
| Peppervine | *Ampelopsis arborea* |
| Phacelia | *Phacelia purshii* |
| Phlox | *Phlox* sp |
| Photinia | *Photinia serrulata* |
| Pickerel-weed | *Pontederia cordata* |
| Pineweed | *Hypericum gentianoides* |
| Pinkweed | *Polygonum pensylvanicum* |
| Pokerberry | *Phytolacca rigida* |
| Poison ivy | *Rhus radicans* |
| Poorjoe | *Diodia teres* |
| Prickly pear | |
| Prostrate spurge | *Euphorbia cordifolia* |
| Queen Ann's lace | *Daucus carota* |
| Queen's delight | *Stillingia sylvatica* |
| Rabbit-tobacco | *Gnaphalium obtusifolium* |
| Rain (Atamasco) lily | *Zephyranthes atamasco* |
| Rattlebox | *Crotalaria spectabilis* |
| Richweed | *Pilea pumila* |
| Rosin-weed | *Silphium compositum* |
| Royal fern | *Osmunda regatis* |
| Rue-anemone | *Anemonella* sp |
| Sandnettle | *Cnidoscolus stimulosus* |
| Sandspur | *Cenchrus longispinus* |
| Sand wort | *Arenaria caroliniana* |
| Sensitivebrier | *Schrankia mirophylla* |
| Sericea | *Lespedeza serica* |
| Skullcaps | *Scutellaria* sp |
| Sida | *Sida spinosa* |
| Silver-leaf aster | *Heterotheca graminiflora* |
| Smart weed | *Polygonum* sp |
| Snakeroot | *Sanicula gregaria* |
| Sneeze weed | *Helenium* ssp |
| Solomon's-seal | *Polygonatum biflorum* |
| Southern Lady fern | *Athyrium filix-femina* |
| Spanish moss | *Tillandsia usneoides* |
| Spider-lily | *Hymenocallis* sp |
| Squaw-root | *Conopholis americana* |
| St. John's wort | *Hypericum virginiana* |
| Stink weed | *Pluchea camphorata* |
| Sunflower | *Helianthus* ssp |
| Swamp aster (blue) | *Aster puniceus* |
| Swamp loosestrife | *Lysimachia terrestris* |
| Swamp milkweed | *Asclepias incarnata* |
| Swamp milkweed | *Asclepias lanceolata* |
| Swamp milkweed | *Ascelpias perennis* |
| Tall coreopsis | *Coreopsis tripteris* |

**TABLE C-2**
**(continued)**
**PLANT SPECIES RECORDED AT ROBINS AFB**

| | |
|---|---|
| Tearthumb smartweed | *Polygonum sagittatum* |
| Thistles | *Cirsium* sp |
| Trailing bean | *Galactia elliottii* |
| Virginia Chain fern | *Woodwardia virginica* |
| Varigated smartweed | *Polygonum amphibium* |
| Venus' looking glass | *Specularia perfoliata* |
| Vetch | *Vicia* sp |
| Violet | *Viola* spp. |
| Virginia creeper | *Parthenocissus quinquefolia* |
| Warea | *Warea cuneifolia* |
| Water primrose | |
| Water meal | *Wolffia* sp |
| Water penny | *Hydrocotyle umbellata* |
| Water willow | *Justicia ovata* |
| White violet | *Viola primulifolia* |
| Wild bean | *Strophostyles umbellata* |
| Wild geranium | *Geranium maculatum* |
| Wild indigo | *Baptisia* sp<br>(*may be B. lanceolata*) |
| Wild lettuce | *Lactuca* sp |
| Wild mustard | *Brassica kaber* |
| Wild sorrel | *Rumex hastatulus* |
| Wild strawberry | *Fragaria virginiana* |
| Yellow-eyed grass | *Xyris* ssp |
| Yellow false foxglove | *Aureolaria virginica* |
| Yellow root | *Xanthorhiza simplicissima* |
| Yellow wood sorrel | *Oxalis stricta* |

**Shrubs**

| | |
|---|---|
| Alder | *Alnus serrulata* |
| Althae | *Hibiscus syriacus* |
| American beauty-berry | *Callicarpa americana* |
| Baccharis | *Baccharis halimifolia* |
| Bicolor lespedeza | *Lespedeza bicolor* |
| Blackberry | *Rubus* ssp |
| Bluestem palmetto | *Sabal minor* |
| Box elder | *Acer negundo* |
| Boxwood | *Buxus sempervirens* |
| Buckthorn | *Bumelia* sp |
| Burford holly | *Ilex burfordi* |
| Buttonbush | *Cephalanthus occidentalis* |
| Camellia | *Camellia japonica* |
| Carolina buckthorn | *Rhamnus caroliniana* |
| Carolina cherry laurel | *Prunus caroliniana* |
| Carolina silverbell | *Halesia caroliniana* |

**TABLE C-2**
**(continued)**
**PLANT SPECIES RECORDED AT ROBINS AFB**

| | |
|---|---|
| Chicksaw plum | *Prunus angustifolia* |
| Chinese privet | *Ligustrum sinense* |
| Cotoneaster | *Cotoneaster* sp |
| Crabapple | *Malus angustifolia* |
| Cyrilla (titi) | *Cyrilla racemiflora* |
| Deciduous holly | *Ilex decidua* |
| Devil's walking stick | *Aralia spinosa* |
| Dog-hobble | *Leucothoe axillaris* |
| Dwarf azalea | *Rhododendron atianticum* |
| Dwarf palmetto | *Sabal minor* |
| Dwarf paw paw | *Asimina parviflora* |
| Elaeagnus | *Elaeagnus* sp |
| Elderberry | *Sambucus canadensis* |
| Evergreen azalea | *Rhododendron* sp |
| Farkleberry | *Vaccinium arboreum* |
| Fetterbush | *Lyonia lucida* |
| Forsythia | *Forsythia* sp |
| Fringetree | *Chionanthus virginicus* |
| Gallberry | *Ilex glabra* |
| Gardenia | *Gardenia jasminoides* |
| Hackberry | *Celtis* sp (*may be georgiana*) |
| Haw | *Viburnum nudum* |
| Hawthorne | *Crataegus* ssp |
| Hercules-club | *Aralia spinosa* |
| Hibiscus | *Hibiscus* sp |
| Highbush blueberry | *Vaccinium corymbosus* |
| Horsesugar | *Symplocos tinctoria* |
| Huckleberry | *Gaylussacia* sp |
| Itea (Virginia willow) | *Itea virginica* |
| Japanese privet | *Ligustrum japonicum* |
| Junipers | *Juniper* sp. |
| Lespedeza (wild) | *Lespedezea hirta* |
| Lespedeza (wild) | *Lespedezea intermedia* |
| Lespedeza (wild) | *Lespedezea angustifolia* |
| Leucothoe | *Leucothoe racemosa* |
| Leucothoe | *Leucothoe axillaris* |
| Lyonia | *Lyonia lucida* |
| Mayberry | *Vaccinium elliottia* |
| Nandina | *Nandina domestica* |
| Needle palm | *Rhapidophyllum hystrix* |
| Oakleaf hydrangea | *Hydrangea quercifolia* |
| Osmanthus | *Osmanthus* sp |
| Pittosporum | *Pittosporums* sp |
| Poorman's soap | *Clethra alnifolia* |
| Pyracantha | *Pyracantha* sp |
| Red Cedar | *Juniperus virginiana* |

**TABLE C-2**
**(continued)**
**PLANT SPECIES RECORDED AT ROBINS AFB**

| | |
|---|---|
| Red tip | *Photintia* sp |
| Rose | *Rosa* sp |
| Sebastiania | *Sebastiania ligustrina* |
| Serviceberry | *Amelanchier canadensis* |
| Silverberry | *Elaeagnus pungens* |
| Smooth azalea | *Rhododendron arborescens* |
| Snowball | *Styrax americana* |
| Southern privet | *Ligustrum vulgare* |
| Southern wild raisin | *Viburnum nudum* |
| Sparkleberry | *Vaccinium arboreum* |
| St. John's wort | *Hypericum* ssp |
| Strawberry bush | *Euonymus americanus* |
| Swamp azalea | *Rhododendron viscosum* |
| Swamp dogwood | *Cornus stricta* |
| Swamp holly | *Ilex ambigua* |
| Sweet-shrub | *Calycanthus floridus* |
| Tag alder | *Alnus serrulata* |
| Titi | *Cyrilla racemiflora* |
| Virginia willow | *Itea virginica* |
| Wild azalea | *Rhododendron canescens* |

**Trees**

| | |
|---|---|
| American beech | *Fagus grandifolia* |
| American elm | *Ulmus americana* |
| American holly | *Ilex opaca* |
| American hornbeam | *Carpinus caroliniana* |
| Bald cypress | *Taxodium distichum* |
| Bastard white oak | *Quercus austrina* |
| Black cherry | *Prunus serotina* |
| Black oak | *Quercus velutina* |
| Black walnut | *Juglans nigra* |
| Black willow | *Salix nigra* |
| Blackgum | *Nyssa sylvatica* |
| Bluejack oak | *Quercus cinerea* |
| Box elder | *Acer negundo* |
| Bradford pear | *Pyrus calleryana var.* |
| Carolina ash | *Fraxinus caroliniana* |
| Carolina buckthorn | *Rhamnus caroliniana* |
| Carolina cherry laurel | *Prunus caroliniana* |
| Carolina silverbell | *Halesia carolina* |
| Catalpa tree | *Catalpa bignonioides* |
| Cherrybark oak | *Quercus pagoda* |
| Chinaberry | *Melia azedarach* |
| Chinese tallow tree | *Sapium sebiferum* |
| Crepe myrtle | *Lagerstroemia indica* |

**TABLE C-2**
**(continued)**
**PLANT SPECIES RECORDED AT ROBINS AFB**

| | |
|---|---|
| Deciduous holly | *Ilex decidua* |
| Eastern cottonwood | *Populus deltoides* |
| Eastern redbud | *Cercis canadensis* |
| Eastern red cedar | *Juniperus virginiana* |
| Florida silver maple | *Acer saccharinum* |
| Flowering dogwood | *Cornus florida* |
| Fringe tree | *Chionanthus virginicus* |
| Green ash | *Fraxinus pennsylvanica* |
| Hackberry | *Celtis occidentalis* |
| Hawthorne | *Crataegus* ssp. |
| Horsesugar (Common sweetleaf) | *Symplocos tinctoria* |
| Large gailberry | *Ilex coriacea* |
| Laurel oak | *Quercus hemisphaerica* |
| Live oak | *Quercus virginiana* |
| Loblolly pine | *Pinus taeda* |
| Longleaf pine | *Pinus palustris* |
| Mimosa | *Albizia julibrissin* |
| Mockernut hickory | *Carya tomentosa* |
| Overcup oak | *Quercus lyrata* |
| Painted buckeye | *Aesculus sylvatica* |
| Paw paw | *Asimina triloba* |
| Pecan | *Carya illinoensis* |
| Persimmon | *Diospyros virginiana* |
| Pignut hickory | *Carya glabra* |
| Pin oak | *Quercus palustris* |
| Planer tree (Water elm) | *Planera aquatica* |
| Pond pine | *Pinus serotina* |
| Post oak | *Quercus stellata* |
| Red bay | *Persea borbonia* |
| Red buckeye | *Aesculus pavia* |
| Red maple | *Acer rubrum* |
| Red mulberry | *Morus rubra* |
| River birch | *Betula nigra* |
| Sand hickory | *Carya pallida* |
| Sassafras | *Sassafras albidum* |
| Scrubby post oak | *Quercus margaretta* |
| Shagbark hickory | *Carya ovata* |
| Shortleaf pine | *Pinus echinata* |
| Slash pine | *Pinus elliottii* |
| Sourwood | *Oxydendrum arboreum* |
| Southern flowering magnolia | *Magnolia grandiflora* |
| Southern red oak | *Quercus falcata* |
| Spruce pine | *Pinus glabra* |
| Sugarberry | *Celtis laevigata* |
| Swamp blackgum | *Nyssa biflora* |

**TABLE C-2**
**(continued)**
**PLANT SPECIES RECORDED AT ROBINS AFB**

| | |
|---|---|
| Swamp chestnut oak | *Quercus michauxii* |
| Swamp dogwood | *Cornus stricta* |
| Swamp laurel oak | *Quercus laurifolia* |
| Swamp privet | *Forestiera acuminata* |
| Swamp tupelo | *Nyssa sylvatica var. biflora* |
| Sweetbay | *Magnolia virginiana* |
| Sweetgum | *Liquidambar styraciflua* |
| Tree sparkleberry | *Vaccinium arboreum* |
| Tulip poplar | *Liriodendron tulipifera* |
| Turkey oak | *Quercus laevis* |
| Water elm | *Planera aquatica* |
| Water hickory | *Carya aquatica* |
| Water oak | *Quercus nigra* |
| Water tupelo | *Nyssa aquatica* |
| Water-willow | *Decodon verticillatus* |
| Weeping willow | *Salix babylonica* |
| White oak | *Quercus alba* |
| Willow oak | *Quercus phellos* |
| Winged elm | *Ulmus alata* |
| Winged sumac | *Rhus copailina* |
| Witch hazel | *Hamamelis virginiana* |

Sources:

Earth Tech/Rust Environment & Infrastructure. April 1999. *Final Rare Plant Survey and Management Plan for Warner Robins Air Logistics Center.*

Georgia Department of Natural Resources, Wildlife Resources Division, Georgia Natural Heritage Program. 1994. *A Rare Species and Natural Communities Survey at Robins Air Force Base, Georgia.*

U.S. Department of Agriculture, Soil Conservation Service. 1989. *Natural Resources Plan, Robins Air Force Base.* SCS, Athens, Georgia.

**TABLE C-3**

**STATE OR FEDERALLY THREATENDED, ENDANGERED, OR RARE SPECIES POTENTIALLY OCCURRING AT ROBINS AIR FORCE BASE**

| Common Name | Scientific Name | Federal Status | State Status |
|---|---|---|---|
| | **Mammals** | | |
| Rafinesque's Big-Eared Bat | *Corynorhius rafinesquii* | None | R |
| | **Reptiles** | | |
| American Alligator | *Alligator mississippiensis* | T (SA) | None |
| | **Amphibians** | | |
| Spotted Turtle | *Clemmys guttata* | None | U |
| | **Fish** | | |
| Altamaha Shiner | *Cyprinella xaenurus* | None | E |
| Goldstripe Darter | *Etheostoma parvipinne* | None | R |
| Shortnose Sturgeon | *Acipenser brevirostrum* | E | E |
| | **Birds** | | |
| Bachman's Sparrow | *Aimophila aestivalis* | None | R |
| Bald Eagle | *Halieetus leucocephalus* | T | E |
| Bewick's Wren | *Thryomanes bewickii* | None | R |
| Swallow-Tailed Kite | *Elanoides forficatus* | None | R |
| Wood Stork | *Mycteria americana* | E | E |
| | **Plants** | | |
| Ocmulgee Skullcap* | *Scutellaria ocmulgee* | None | T |
| Harper's Wild Ginger* | *Hexastylis shuttleworthii var. harperi* | None | U |

E = Endangered
R = Rare
T = Threatened
T (SA) = Threatened due to similar appearance
U = Unusual
* = State protected species

# Appendix D

## Policy Letters and Agreements

Integrated Natural Resources Management (RAFBI 32-7064)

MOU for Hunting and Fishing Regulations Enforcement

U.S. Fish and Wildlife Service Interim Guidelines for Recommendations on Communications Towers Siting, Construction, Operation, and Decommissioning

*BY ORDER OF THE COMMANDER*
*WARNER ROBINS AIR LOGISTICS CENTER*

*RAFB INSTRUCTION 32-7064*

*30 July 2001*

*Civil Engineering*

*INTEGRATED NATURAL RESOURCES MANAGEMENT*

**NOTE: This is a Draft Document under final review.**

**COMPLIANCE WITH THIS PUBLICATION IS MANDATORY**

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**NOTICE:** This publication is available digitally on the Robins Home Page at: http://www.robins.af.mil/imweb/IMP.htm. Customers with no access to electronic media should contact 78 CS/SCSP ext 62401 for assistance in obtaining a printed copy.

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Supersedes RAFBI 32-7064 (24 Jan 97)

Certified by: WR-ALC/EM, (Steve Coyle)
Pages: 9
Distribution: F

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This instruction establishes policies and procedures for conserving and protecting natural resources on Robins Air Force Base (RAFB). Natural resource issues addressed in this instruction include fishing and hunting, wildlife and plant hazards, off-road/all-terrain vehicles, urban forest management, landscaping, water conservation, and pesticide use reduction. This instruction aligns with AFPD 32-70, *Environmental Quality*, and implements AFI 32-7064, *Integrated Natural Resources Management.* It applies to all persons on RAFB.

## 1. RESPONSIBILITIES:

**1.1. Environmental Management Directorate.** The Environmental Management Directorate (WR-ALC/EM) shall be the OPR for Integrated Natural Resources Management (INRM). WR-ALC/EM shall plan and carry out natural resource tasks through the use of scientifically sound management techniques. WR-ALC/EM shall provide expertise and support to the Center Commander (WR-ALC/CC) in order to ensure installation compliance with restrictions set forth in the Endangered Species Act and Amendments, the Clean Water Act, and all other applicable Air Force, state, and federal laws and regulations. WR-ALC/EM shall establish an INRM Plan coordinated with the 78th Civil Engineering Group (78 CEG), 78th Services Division, and 78th Security Forces Squadron (78 SFS).

**1.1.1.** WR-ALC/EM shall set the hunting season opening and closing dates, bag limits, catch limits, equipment restrictions, and other regulations that govern the harvest of fish and wildlife resources. WR-ALC/EM shall work with the Georgia Department of Natural Resources (DNR), United States Fish and Wildlife Service (FWS), and 78 SFS to maintain a Memorandum of Understanding (MOU) regarding the enforcement of fishing and hunting regulations on RAFB.

**1.1.2.** WR-ALC/EM shall manage a nuisance animal control agreement with the US Department of Agriculture, Wildlife Services Division. WR-ALC/EM shall ensure that permits necessary for the control of nuisance wildlife are acquired from the appropriate regulatory agencies, and that the base remains in compliance with stipulations listed in those permits.

**1.1.3.** The WR-ALC/EM natural resources manager shall inspect all trees requested for removal, and shall attempt to minimize the removal of healthy trees on RAFB. Prior to their implementation, tree planting plans and other landscaping plans shall be reviewed and approved by WR-ALC/EM.

**1.1.4.** WR-ALC/EM shall promote practices that conserve water, and shall implement Georgia Environmental Protection Division directives for water use restrictions. WR-ALC/EM shall work with other base organizations to evaluate the potential for capturing and utilizing storm water runoff (i.e. water harvesting), and/or using treated wastewater.

**1.1.5.** The WR-ALC/EM natural resource manager shall chair the base INRM Integrated Process Team (INRM IPT) and the Pesticide Use Reduction Integrated Process Team (Pesticide IPT).

**1.2. 78 CEG**.

**1.2.1.** The 78 CEG is an OCR for INRM. It is the responsibility of the Commander, 78 CEG, in consultation with the natural resource manager, WR-ALC/EM, to plan and regulate planting, removal, maintenance, and protection of urban trees and shrubs; to eliminate and guard against dangerous conditions which may result in injury to persons or damage to property; to promote and enhance the natural beauty of the installation; to protect trees and shrubs from undesirable conditions; and to protect trees and shrubs against the spread of disease or pests. Prior to their implementation, tree planting plans and other landscaping plans shall be reviewed and endorsed by the Grounds Maintenance Manager, 78 CES/CEOEC.

**1.2.2.** 78 CEG shall help to ensure that water use restrictions are complied with by all organizations.

**1.3. 78 Services Division.**

**1.3.1.** The 78 Services Division, Outdoor Recreation Office, is an OCR for INRM. The Outdoor Recreation Office shall sell permits for hunting and fishing, and shall verify that permits are issued or sold to authorized persons only. This office shall also provide information on fishing and hunting regulations to anglers and hunters, and shall sponsor a hunting areas orientation class. Additionally, this office shall ensure that hunters who wish to use all-terrain vehicles (ATVs) in Hunting Area D shall first have descriptive information concerning their ATVs recorded in the Nature Center log.

**1.4. 78 SFS.**

**1.4.1.** The 78 SFS is an OCR for INRM. Robins AFB has established a MOU between the FWS, DNR, 78 SFS, and WR-ALC/EM regarding the enforcement of hunting and fishing regulations on base. The 78 SFS shall enforce rules concerning safety and environmental issues in base fishing areas including personal flotation device requirements, prohibitions on swimming, wading, and improper trash disposal, and prohibitions on the use of boats with gasoline or other internal combustion engines. The 78 SFS shall provide support to the natural resource manager, WR-ALC/EM, when the latter encounters problems with violators of fishing and hunting rules.

**1.4.2.** The 78 SFS shall enforce rules governing the use of ATVs.

**2. TERMS.** See AFI 32-7064 for explanation of terms.

**3. HUNTING AND FISHING:**

**3.1. ELIGIBILITY.** All military (active duty and retired) personnel and members of their immediate family may hunt and fish on RAFB. Department of Defense (DoD) employees assigned to RAFB may participate on a space-available basis. Guests of military and civilian personnel must be accompanied by the sponsor at all times.

**3.2. LICENSES AND PERMITS:**

**3.2.1. Fishing.** While fishing, persons 16 years of age or older shall have a valid State of Georgia fishing license and a RAFB fishing permit in their possession at all times and shall show to any enforcement official, including the base natural resource manager, upon request. An adult shall accompany any person less than 12 years of age who is fishing. In cases where a family is fishing, one member shall be able to produce the family permit if so requested. Permits may be purchased during regular duty hours at the Spalding Nature Center, building 1305.

**3.2.2. Hunting.** While hunting, persons 16 years of age or older shall have a valid State of Georgia hunting license and a RAFB hunting permit in their possession at all times and shall show to any enforcement official, including the base natural resource manager, upon request. No one under 18 shall hunt unless under direct adult supervision. Permits may be purchased during regular duty hours at the Spalding Nature Center, building 1305.

**3.2.2.1. Hunting Orientation Class.** All persons wishing to hunt shall attend the base hunter orientation class. Sponsors shall accompany immediate family members and sponsored guests who have not attended the orientation class. Contact the Spalding Nature Center for information regarding this class.

**3.2.2.2. Passes.** An access pass shall be acquired from the Nature Center before scouting or hunting in any of the hunting areas.

### 3.3. LIMITATIONS AND PROHIBITIONS:

**3.3.1. Fishing.** Fishing regulations for RAFB are the same as those established by the Georgia Department of Natural Resources (DNR), in addition to a few base-specific requirements. If guidance regarding a particular fishing regulation question cannot be found in the following paragraphs, refer to DNR's sport fishing regulations (a copy of which is available at DNR offices and at most retail outlets where fishing goods are sold).

3.3.1.1. Fishing is authorized at Scout Lake, Luna Lake, Duck Lake, and the section of Horse Creek located south of the pipeline bridge and west of Hunting Area D. Persons fishing Horse Creek should be aware that this creek is located within a hunting area. Contact the Spalding Nature Center for a map of the hunting areas.

3.3.1.2. Fishing is not authorized in any pond containing a weir, including the three spill containment ponds located along Beale and Borghese Drives. Fishing is not authorized in the wetlands north of the road that leads to the City of Warner Robins Sewage Treament Plant, located north of the airfield. Fishing is not authorized on the golf course property, or on the property leased by RAFB (i.e., Hunting Area D).

3.3.1.3. Catch and possession limits per 24-hour period are those established by DNR.

3.3.1.4. Do not use live fish as bait.

3.3.1.5. Do not gig frogs or take by any other means.

3.3.1.6. Do not use seines, cast nets, spears, or trot lines. Landing nets may only be used to land fish legally caught. Bow fishing is not authorized.

3.3.1.7. Do not use more than two fishing lines, regardless of whether the lines are fastened to a pole, a rod and reel, or hand-held.

**3.3.2 Hunting.** Hunting regulations for RAFB are the same as those established by DNR, in addition to a few base-specific requirements. If guidance regarding a particular hunting regulation question cannot be found in the following paragraphs, refer to DNR's hunting season regulations (a copy of which is available at DNR offices and at most retail outlets where hunting goods are sold). Deer, feral hog, turkey, waterfowl, and squirrel are the only authorized game that may be taken.

**3.3.2.1. Small Game**. Small game hunting on base is limited to squirrel hunting with 20 gauge shotguns or larger, with shot as authorized under state law. Small game hunting on off base property (i.e., Area D) is restricted to rim-fire rifles and shotguns as authorized under Georgia law.

**3.3.2.2. Big Game.** Weapons authorized for hunting deer, feral hog, and turkey on and off base property are 20 gauge shotguns or larger, muzzle-loading black powder rifles, and bows and arrows. No other weapons are authorized.

**3.3.2.3. Waterfowl.** Ducks and geese may be taken only with shotguns, 20 gauge or larger. Nontoxic shot such as steel, bismuth, or tungsten must be used. Hunters may not possess lead shot when hunting waterfowl. See DNR's hunting season regulations for additional guidance.

**3.3.2.4. Weapons.** Concealed weapons and handguns are not authorized; carry weapons openly. The transportation of a loaded firearm in or upon a motor vehicle, ATV, horse, or power-driven boat is prohibited. Do not carry muzzle-loading rifles with the source of ignition in place. Do not hunt from a vehicle, plane, or boat under power.

**3.3.2.5. Other restrictions and prohibitions:**

3.3.2.5.1. Hunting Areas A and B are limited to archery hunting. Long or compound bows authorized under Georgia State law may be used.

3.3.2.5.2. Hunting Areas C and D are limited to muzzle-loading rifles of .44 caliber or larger, or to shotguns that are 20 gauge or larger with slugs. Buckshot is not allowed. Bows and arrows as specified by Georgia State law are also authorized.

3.3.2.5.3. The gate at the northern entrance to Hunting Area D (the pipeline bridge) is kept locked to keep unauthorized individuals out. A key or lock combination will be provided to the hunter once he or she checks in at the Spalding Nature Center.

3.3.2.5.4. **Hunting on the Leased Property (Area D).** Robins AFB has an agreement with Bradley Plywood Company for the hunting rights to 1,800 acres. The success of this agreement is contingent on the ethical behavior of the hunters. Do not damage trees or start fires. Do not shoot dove or quail. (Note: although these rules are in the property lease, they also apply to Hunting Areas A, B, and C.)

3.3.2.5.5. Do not hunt within 50 yards of any public road. Hunting is not allowed on gas line or power line clearings.

3.3.2.5.6. All game taken on RAFB must be checked in at the Spalding Nature Center as soon as practical after killing. If the office is closed, leave a note or call 926-4500 and leave a message.

3.3.2.5.7. Pick up a map at the Nature Center. Do not overrun or bypass roadblocks, barriers, gates, chains, restricted areas, and warning signs for any reason without prior clearance. There are no authorized hunting areas north of the gas line that extends east from the Horse Creek pipeline bridge to the Ocmulgee River. Do not cross Sandy Run Creek (i.e., the southern boundary of the base).

3.3.2.5.8. Do not use a trap, snare, net, pitfall, deadfall, baited hook, live decoy, salt lick, or any other luring device while hunting. Do not hunt over a baited area, and do not use lights to blind wildlife.

3.3.2.5.9. Do not hunt with dogs or with electronic communications equipment.

3.3.2.5.10. Do not drive nails into trees, or hunt from or construct permanent tree stands.

3.3.2.5.11. Do not capture and hold, release, or import wildlife or feral hogs.

3.3.2.5.12. Do not use drugs, poisons, chemicals, smoke, gas, explosives, or electronically-amplified sounds to hunt game species.

3.3.2.5.13. Scouting for game is authorized any day up to the start of hunting season. Individuals shall obtain a season permit before they are authorized to scout the areas.

### 3.4. CONSERVATION AND SAFETY:

3.4.1. Boats with gasoline or other internal combustion motors are prohibited on base lakes, Horse Creek, or base-leased waters. The use of electric trolling motors with no petroleum discharge is permitted.

3.4.2. Swimming or wading in the base lakes is prohibited.

3.4.3. Boats are required to contain at least one Coast Guard approved Personal Floatation Device (PFD) per occupant. PFDs are required to be readily accessible, of appropriate size for occupants, and in serviceable condition. Children under 12 and all non-swimmers shall wear a PFD while in boats on RAFB waterways. Use of boats shall be in strict accordance with Georgia State boating regulations.

3.4.4. Anyone (including archery hunters) hunting deer, hog, or turkey during the firearms seasons, or accompanying a hunter during firearms seasons, shall wear an outer garment showing at least 500 square inches of daylight fluorescent orange visible above the waist.

3.4.5. Hunters are encouraged to hunt in pairs and must carry a compass and flashlight. Snake boots, chaps, or some other type of anti-snakebite clothing is advised. (Note: see Section 4, Wildlife and Plant Hazards.)

3.4.6. Do not start fires in hunting areas.

3.4.7. Vehicles and effects are subject to being searched for illegal game and weapons.

**3.5. Closure of Areas.** Hunting areas may be closed due to training. This information shall be posted at the Spalding Nature Center, the Equipment Rental Office, and at the entrances to these areas by the Outdoor Recreation Office.

**3.6. Noncompliance.** The Outdoor Recreation Office shall report violations to WR-ALC/EM 6-1197. Violations are subject to processing under the federal magistrate's criminal process, the UCMJ, state criminal and civil enforcement, civilian employee administrative processes, military administrative processes, base privileges administrative processes, and debarment procedures. The privilege of fishing or hunting on RAFB may be suspended for a period of up to 6 months for the first offense. A second violation may result in permanent suspension of privileges, payment of fines, and possible prosecution.

## 4. WILDLIFE AND PLANT HAZARDS:

4.1. RAFB supports an array of wildlife and plant species. Most are harmless, and those that do pose a hazard to people rarely are encountered. These hazards can be reduced with the implementation of a few simple precautions.

4.2. With the exception of feeders for birds, base personnel shall not feed wildlife.

4.3. Garbage containers, such as dumpsters, should be properly sealed at all times. Food wastes shall not be placed in containers (including some dumpsters) which cannot be sealed, or left in plastic bags beside containers.

4.4. Do not try to approach, touch, or capture wild animals, including strange dogs and cats. Many species of wildlife are protected by state or federal law including nearly all bird species and their nests (i.e., when occupied by eggs or young), non-poisonous snakes, land turtles, and game species such as deer, turkey, mourning dove, and wood duck. Additionally, do not harass or harm inherently dangerous animals such as black bears and alligators.

4.5. When traveling in forested or other remote areas of the base, always tell someone where you will be and when you will return. Take along a companion, a two-way radio, map, compass, flashlight, and insect repellant, and always wear some form of snake protection such as snake chaps or boots. Wear a hat and sunscreen, and carry a supply of water. Know how to identify poison ivy, and take the time to learn about wildlife hazards before going into the woods.

## 5. OFF-ROAD/ALL-TERRAIN VEHICLES

5.1. Off-road or all-terrain vehicles (hereafter referred to as ATVs) are defined as any motorized vehicle with three or four wheels, low pressure tires, a wheel base of 50 inches or less, an overall weight of 600 pounds or less, a handlebar for steering, and a seat designed to be straddled. This section of this instruction also establishes restrictions regarding the use of vehicles other than ATVs in forests and wetlands.

5.2. Areas where ATVs may and may not be used.

5.2.1. Training. ATVs may be used only for official DOD training purposes on the Dirt Track, located west of DRMO, and on established roads and trails in the South 800 Area/Obstacle Course near the PRIME BEEF Area. If mission needs necessitate the use of ATVs for DoD training purposes in other areas of the base, their use shall first be approved by WR-ALC/EM.

5.2.2. Hunting. ATVs may be used by hunters, and only during hunting seasons for deer and hog, on the natural gas pipeline road east of the Horse Creek Bridge, and on the dirt road that accesses the southern portion of Hunting Area D, east of the base Skeet Range. Automobiles may also be used by deer and hog hunters on the road that accesses the southern portion of Hunting Area D; however, vehicles that are designed for off-road travel such as pickup trucks and Jeeps are recommended, as this road is ungraded.

5.2.3. Archery. ATVs may also be used on established trails at the Archery Range for the purpose of transporting targets in support of tournaments and other special events.

5.2.4. Vehicle use restrictions. No other type of vehicle is authorized for use on the natural gas pipeline road, the Dirt Track, the South 800 Area/Obstacle Course, or the Archery Range trails, with the exception of those types of vehicles described in paragraph 5.3. ATVs shall not be used for recreational purposes in any other areas of the base. ATVs must be transported to the hunting area, Archery Range, or the training areas by trailer or truck.

5.3. ATVs, or any other type of vehicle, are not authorized for use in forests and wetlands, with the following exceptions: 1) those used for emergency purposes; 2) any civil engineering vehicle performing authorized work; 3) any combat or combat support vehicle when used for national defense purposes; 4) landscape maintenance vehicles; and 5) vehicles used in support of the natural resource management program. If habitat damage attributed to ATV use is detected in wetlands in hunting areas, ATVs shall be barred from the gas pipeline road and from Hunting Area D.

5.4. All ATVs shall be licensed and insured according to Air Force and State regulations. All ATV operators shall possess a State driver's license. Hunters who plan to operate ATVs on the natural gas pipeline road or the dirt road in the southern portion of Area D shall first have the make, color, and any other relevant information regarding their ATVs logged in the record book at the Spalding Nature Center (Bldg 1305). This shall be done in advance each time a hunter plans to drive his/her ATV into a hunting area. Minors operating ATVs shall carry a learner's license and be under the supervision of an adult who has a State driver's license.

5.5. Persons operating ATVs shall wear personal protective equipment as described in AFI 91-207, *USAF Traffic Safety Program*. Passengers are not allowed on ATVs.

5.6. All ATVs shall be equipped with a muffler and spark arrestor in good working order, and shall conform to State laws regarding vehicle pollution emissions and noise.

5.7. Anyone driving recklessly, operating an ATV while under the influence of alcohol or drugs, or driving in areas where the use of ATVs is prohibited shall be ticketed by the 78 SFS or other authorized enforcement officials.

## 6. URBAN FOREST MANAGEMENT

6.1. Urban forest is defined as those areas lying within the developed portions of the base, to include the industrial area, training areas, the airfield, and base housing areas. To implement this portion of the instruction, personnel shall be formally trained in the principles and practices of urban forestry and horticulture.

6.2. The provisions of this instruction shall be applicable to all urban trees and shrubs presently occurring or hereafter planted in the urban areas of RAFB.

6.3. WR-ALC/EM shall prepare and/or review all urban forest management plans associated with existing and new facilities. The natural resources manager shall inspect all trees designated for removal, and shall attempt to minimize the removal of healthy trees on RAFB. Trees shall not normally be removed unless they are a hazard to personnel or property, inhibit a mission need such as construction, their removal will protect the health of other trees or other natural resources (e.g., diseased trees or invasive exotic species), or their removal is part of a plan to promote forest productivity or biodiversity.

6.4. The Robins INRM IPT, chaired by the base natural resources manager, shall consist of members from organizations typically involved with tree management or problems associated with trees. The INRM IPT shall meet on a quarterly (or as needed) basis to review tree management issues (and landscaping issues), and shall make recommendations to the 78 CEG/CC and EM regarding urban forest management.

6.5. The urban forest management program shall promote the principles of ecosystem management and biodiversity endorsed by the Air Force, shall encourage the planting of native species of trees and shrubs, and shall discourage the planting of exotic tree and shrub species.

## 7. LANDSCAPE PLANS

7.1. Prior to their implementation, all landscaping plans shall be reviewed and endorsed by both WR-ALC/EM and the Grounds Maintenance Manager, 78 CES/CEOEC. This includes plans for the planting of trees, shrubs, flowers, turfgrass, and other types of ground cover.

7.2. The Robins INRM IPT, chaired by the base natural resources manager, shall consist of members from organizations typically involved with landscaping management. The INRM IPT shall meet on a quarterly (or as needed) basis to review landscaping issues (or tree management issues), and shall make recommendations to the 78 CEG/CC and EM regarding landscape management

## 8. WATER CONSERVATION

8.1. Water conservation shall be achieved through the establishment of low-maintenance landscaping, water recycling, leak detection and repair, and incremental water use restrictions during periods when drought becomes severe.

8.2. Irrigation of landscaping, including lawns in Military Family Housing, shall normally be accomplished between 2000-1100 hrs. However, this time interval may be adjusted periodically via base policy letters depending on statewide water use restrictions. Most plants should receive no more than 1-2 inches (1.5-2 hours of irrigation) of water per week, even during periods of drought, and they should not be watered during periods when rainfall is adequate. Drip or trickle irrigation and other low-flow irrigation techniques shall be installed, when practical, and sprinkler heads shall be properly calibrated to ensure that they are not spraying streets, sidewalks, and parking lots. Lawns should be watered every 4 days during dry periods, less often during rainy periods. Lawns need three-quarters of an inch of water each time they are watered (about 1-1.5 hours of operation for most sprinkler systems).

8.2.1. Fine-textured mulch shall be established to a depth of 3 inches around trees, shrubs, and other landscape plants. Landscape designs shall feature drought-tolerant plants, and shall incorporate the principles of xeriscaping. The use of annual and perennial plants, including turfgrasses, shall be minimized in landscape designs. Trees and other vegetation shall not be fertilized or pruned during extended droughts. However, trees may be pruned to remove safety hazards.

8.3. During periods of drought, water use shall be restricted on an incremental basis via the following phases:

**8.3.1. Phase I.** When all pumping equipment is operational and the water level in the storage towers fluctuates (i.e. the towers fill up and the pumping equipment briefly stops), Water Plant personnel on duty shall notify the Civil Engineering Control Center, 6-5657, of the existing condition. The plant operator shall remain in contact with the Control Center until the fluctuations cease. If they do not cease, the following water use restriction shall be implemented:

8.3.1.1. Turfgrass areas and ornamental plants around housing shall be watered on an odd/even day schedule according to the house number. Turfgrass areas and ornamental plants around facilities and those areas maintained by the Grounds Maintenance Contractor shall be watered every other day.

8.3.1.2. For the golf course: stop washing turfgrass equipment, and inspect irrigation equipment daily.

**8.3.2. Phase II.** When all pumping equipment is operational and the water level in the storage towers is at one-half capacity, the following water use restrictions will apply:

8.3.2.1. Cease all vehicle and non-mission critical aircraft washing.

8.3.2.2. Increase surveillance for leaking or ruptured mains.

8.3.2.3. Increase job order priority to urgent on all leaking faucets, fire hydrants, and similar devices.

8.3.2.4. Turfgrass areas and ornamental plants around housing shall be watered on an odd/even day schedule according to the house number, a maximum of two times per week. Turfgrass areas and ornamental plants around facilities and those areas maintained by the Grounds Maintenance Contractor shall be watered a maximum of two times per week.

8.3.2.5. For the golf course: water turfgrass every other day.

**8.3.3. Phase III.** When all pumping equipment is operational and the water level in the storage towers is at one-third capacity, the following water use restrictions shall apply:

8.3.3.1. Cease watering all turfgrass areas.

8.3.3.2. Housing occupants should refrain from using bath tubs for bathing. Showers should be used instead, and toilet flushing should be reduced when possible.

8.3.3.3. For the golf course: stop all watering except for tees and greens.

**8.3.4. Phase IV.** In the event that the pumping equipment or the distribution system equipment fails:

8.3.4.1. Cease all outdoor irrigation/watering activities.

8.3.4.2. Implement measures i-iii from Phase II.

8.3.4.3. Implement measure ii from Phase III.

8.3.4.4. For the golf course: stop all watering.

8.4. WR-ALC/EM shall work with other organizations to evaluate the potential for capturing and utilizing stormwater runoff (i.e. water harvesting), and/or using treated wastewater. Water shall be recycled whenever practical.

## 9. PESTICIDE USE REDUCTION

9.1. Pesticide use reduction is a high priority within DoD. This section of the instruction details steps for further reductions.

9.2. The base Pesticide IPT shall monitor pesticide use trends, and shall evaluate and identify opportunities for reducing usage. The Pesticide IPT shall consist of representatives from all organizations and contractors that use pesticides on base including the Entomology Shop and Golf Course, shall meet annually (or as needed), and shall be chaired by the base natural resource manager.

9.3. The base Pest Management Plan shall be reviewed and approved annually by WR-ALC/EM.

9.4. Measures to control nuisance flying insects shall not be implemented until they have been approved by the natural resource manager.

9.5. Pesticide fogging shall only be conducted when surveillance data justify its need.

9.6. Organizations and contractors desiring to use larvacides on base shall first have their use approved by WR-ALC/EM.

9.7. The use of Integrated Pest Management strategies to eliminate insects shall be the preferred method of control.

STEVEN W. COYLE
Director, Environmental Management

# MEMORANDUM OF UNDERSTANDING
# FOR ENFORCEMENT OF HUNTING AND FISHING REGULATIONS

## BETWEEN ROBINS AIR FORCE BASE,
## THE UNITED STATES FISH AND WILDLIFE SERVICE,

## AND THE

## GEORGIA DEPARTMENT OF NATURAL RESOURCES

## PURPOSE

This Memorandum of Understanding (MOU) is made and entered into between Robins Air Force Base (RAFB), the U.S. Fish and Wildlife Service, hereinafter referred to as the Service, and the Georgia Department of Natural Resources, hereinafter referred to as the Department, for the purpose of ensuring the enforcement of hunting and fishing regulations on RAFB.

## RESPONSIBILITES

Whereas, the 78 Air Base Wing Commander of RAFB has jurisdiction over the natural resources of the installation and is responsible for ensuring the conservation of the fish and wildlife thereon; and

Whereas, the Service is responsible for the welfare of fish and wildlife on property under exclusive federal jurisdiction, and oversees the management and conservation of migratory birds and rare species; and

Whereas, the Department is charged with the conservation and regulation of fish and wildlife in the state of Georgia; and

Whereas, it is the mutual desire of RAFB, the Service, and the Department to work together to ensure the conservation of fish and wildlife on RAFB for the best interest of the people of the state of Georgia and the United States.

Therefore, it is mutually agreed that:

### Section 1. Responsibilities of RAFB.

Within the limits of the assigned military mission, and the availability of funds and personnel, RAFB agrees to:

1. Establish hunting and fishing rules for the installation via RAFB Instruction 32-7064 (attachment 1). These rules will be based on those of the Department and the Service, and may be more restrictive in order to support the mission of RAFB. The development of these rules will be coordinated with the Department and the Service.

2. Issue base hunting and fishing permits, and ensure persons who request permission to hunt or fish have the appropriate licenses required by the Department and the Service.

3. Provide hunter safety training and ensure all hunters born on or after 1 Jan 1961 have completed a Hunter Safety Course.

4. Make applicable State and Federal hunting and fishing guidelines and base hunting and fishing rules available upon request. Ensure that base hunting and fishing rules are provided and explained before anyone receives a base hunting or fishing permit.

5. Sponsor a base hunting area orientation class, and provide hunting area maps to hunters.

6. Maintain a record of wildlife harvested.

7. Control access to property leased by the Government (i.e., Hunting Area 'D;' see attachment 2). Trees along the boundary between the base and the leased property will be marked with spray paint so the property line is identifiable in the field.

8. Promote the conservation of fish and wildlife populations via an integrated natural resources management plan. Copies of this plan will be submitted to the Service and the Department.

9. Enforce rules concerning safety and environmental issues in base fishing areas including personal flotation device requirements, prohibitions on swimming, wading, and trash disposal, and prohibitions on the use of boats with gasoline or other internal combustion motors.

10. Ensure areas where signs are posted forbidding fishing are not fished.

Section II. Responsibilities of the Service.

Consistent with its objectives and responsibilities, the Service agrees within the limitations of funds and personnel to:

1. Investigate Service-enforced statutes, treaties, and regulations as authorized by law.

2. Stop and advise the entry controller (i.e., the gate guard) as to the purpose of the visit prior to entering RAFB. It is not necessary to contact RAFB prior to entering the leased property (i.e., Hunting Area 'D') from the Ocmulgee River.

3. Provide guidance on federal fish and wildlife law enforcement issues to RAFB.

Section III. Responsibilities of the Department.

Consistent with its objectives and responsibilities, the Department agrees within the limitations of funds and personnel to:

1. Within proprietary areas of the installation, enforce State and applicable Federal regulations pertaining to fish and wildlife. Within exclusive areas, enforce applicable Federal regulations pertaining to fish and wildlife.

2. When a violation of base-specific rules is observed, cite the violator for fishing or hunting without permission [pursuant to Georgia Code Annotated, 27-3-1(a)], and notify the 78 SFS (926-2187) and the 78 SPTG/SVRO (Spalding Nature Center; 926-4500) concerning the infraction.

3. Stop and advise the entry controller (i.e., the gate guard) as to the purpose of the visit prior to entering RAFB. It is not necessary to contact RAFB prior to entering the leased property (i.e., Hunting Area 'D') from the Ocmulgee River.

4. Provide guidance on fish and wildlife law enforcement issues to RAFB.

Section IV. Joint Responsibilities of RAFB, the Service, and the Department.

1. Coordinate with all other parties on matters pertaining to the regulation of hunting and fishing on RAFB.

2. Meet at least annually to discuss hunting and fishing issues on RAFB.

This MOU will become effective upon the date subscribed by the last signatory, and shall remain in effect indefinitely unless terminated by any of the parties to this agreement.

DEPARTMENT OF THE AIR FORCE

DATE 12 Dec 1997 By _____
78 Air Base Wing Commander,
Robins Air Force Base

DEPARTMENT OF THE INTERIOR

DATE 7-30-98 By _____
Acting
Regional Director, United States
Fish and Wildlife Service

STATE OF GEORGIA

DATE 11 Jun 1998 By _____
Director, Georgia Department of
Natural Resources, Wildlife Resources
Division

Attachments:
1. RAFB Instruction 32-7064
2. Map of Hunting Areas
3. Jurisdictional Map

**NOTE: This instruction has been updated and is in final review. The revised draft instruction (dated July 2001) can be found at the front of this appendix.**

*BY ORDER OF THE COMMANDER*
*WARNER ROBINS AIR LOGISTICS CENTER*
*ROBINS AIR FORCE BASE GA 31098*

*RAFB INSTRUCTION 32-7064*
*24 January 1997*

*Civil Engineering*

# *INTEGRATED NATURAL RESOURCES MANAGEMENT*

This instruction establishes policies and procedures for recreational fishing and hunting on Robins Air Force Base (RAFB). It aligns with AFPD 32-70, *Environmental Quality*, and implements AFI 32-7064, *Integrated Natural Resources Management.* It applies to all active duty and retired military personnel, reservists, civilian employees of RAFB, their families, and bona fide guests thereof.

**1. RESPONSIBILITIES:**

**1.1. Environmental Management Directorate.** The Warner Robins Air Logistics Center Environmental Management Directorate (WR-ALC/EM) will plan and carry out fish and wildlife management tasks through the use of biologically sound wildlife management techniques. The WR-ALC/EM directorate will provide expertise and support to the RAFB Installation Commander (WR-ALC/CC) in order to ensure installation compliance with restrictions set forth in the Endangered Species Act and Amendments, and all other applicable Air Force, state, and federal laws and regulations. The WR-ALC/EM Directorate will establish an integrated fish and wildlife management plan coordinated with the 78th Services Division, Recreation Support Flight (78 SVS/SVR). The WR-ALC/EM Directorate will set the hunting season opening and closing dates, bag limits, and other regulations that govern the harvest of fish and wildlife resources. The WR-ALC/EM Directorate will work with the Georgia Department of Natural Resources (DNR) and the United States Fish and Wildlife Service to establish a Memorandum of Understanding regarding the enforcement of fishing and hunting regulations on RAFB.

**1.2. Services Division.** The Recreation Support Flight, will provide supervision to the check-out station which sells permits for hunting on the base, and will verify that permits are issued or sold to authorized persons only. This office will also provide information on fishing and hunting regulations to recreational fisherman and hunters.

**2. TERMS:** See AFI 32-7064 for explanation of terms.

**3. ELIGIBILITY:**

**3.1. Military.** All military (active duty and retired) personnel and members of their immediate family.

**3.2. Civilian Employees.** All Department of Defense (DoD) employees assigned to Robins AFB may participate on a space-available basis.

**3.3. Guests.** Bona fide guests of military and civilian personnel must be accompanied by the sponsor at all times.

**4. LICENSES AND PERMITS:**

**4.1. Fishing.** While fishing, persons 16 years of age and older must have a valid State of Georgia fishing license and an RAFB fishing permit. Persons 16 years of age and older who are not Georgia residents must purchase a nonresident fishing license. Persons who are fishing must have a Georgia State fishing license and base permit in their possession at all times and must show to any enforcement official upon request. In cases where a family is fishing, one member must be able to produce the family permit if so requested. Permits and licenses may be purchased during regular duty hours at the Spalding Nature Center (78 SVS/SVROE), building 1305.

**4.2. Hunting.** While hunting, persons must possess all required Georgia State hunting licenses and a base hunting permit. Licenses and proper identification must be presented when registering to obtain a base permit.

*Supersedes WR-ALC-RAFB Regulations 126-2, 19 Sep 90, and 126-3, 31 Jul 86*
*OPR: WR-ALC/EMX, (Robert Sargent)*
*Certified by: WR-ALC/EM, (Gregg Beecher)*
*Editor: Patricia E. Wolfe*
*Pages: 3/Distribution: F,X:*
*HQ AFMC; AUL/LDEA Maxwell AFB AL 36112-5564. . . 1*

The Outdoor Recreation personnel (78 SVS/SVRO) will check individuals for an access pass when entering and leaving the hunting area. Small game hunters will be allowed to hunt with just the season hunting permit until the opening of big game season. Once big game season opens, all hunters must pick up an access pass. Permits and licenses may be purchased during regular duty hours at 78 SVS/SVROE.

4.2.1. **Hunting Orientation Class.** All persons wishing to hunt must attend the hunter orientation class every two years. Sponsors are solely responsible for and must accompany immediate family members and sponsored guests who have not attended the orientation class. Contact 78 SVS/SVRO for dates and times of orientation classes.

4.2.2. **Passes.** Hunters may obtain three-day passes starting at 1200 on Wednesday. The access pass is valid for 1.5 hours before official sunrise to 1 hour after official sunset. Individuals must return the access pass and gate key to the Nature Center not later than the following Wednesday. Failure to return the key will result in a $5 replacement fee.

**5. LIMITATIONS AND PROHIBITIONS:**

**5.1. Fishing.** Fishing regulations for RAFB are the same as those established by the Georgia Department of Natural Resources (DNR), along with the following base-specific regulations.

5.1.1. The following catch and possession limits per 24-hour period apply for on base lakes. The possession limit for any combination of catfish and bass will be no more than five per 24-hour period.

| **Species** | **#** | **Legal Size** |
|---|---|---|
| Catfish | 5 | 8 inches or larger |
| Bass | 5 | 12 inches or larger |
| Bream | 15 | Any size |
| Crappie | 10 | Any size |

5.1.2. Do not use live fish as bait.

5.1.3. Do not gig frogs or take by any other means.

5.1.4. Do not use seines, spears, or trot lines.

5.1.5. Do not use more than two fishing lines, regardless of whether the lines are fastened to a pole, a rod and reel, or hand-held.

5.1.6. Boats with gasoline or other internal combustion motors are prohibited on base lakes or base-leased waters. Electric trolling motors with no petroleum discharge are permitted on base lakes and suitable leased waters.

5.1.6.1. **Conservation and Safety.** Personnel using base fishing areas should practice safety, observe posted and restricted areas, properly dispose of trash, avoid water pollution, and practice those fundamentals of conduct normally referred to as "good sportsmanship." The following rules of safety apply:

5.1.6.2. An adult must accompany any person less than 12 years of age who is fishing.

5.1.6.3. Swimming or wading in the base lakes is prohibited.

5.1.6.4. Boats are required to contain at least one Coast Guard approved Personal Floatation Device (PFD) per occupant. PFDs are required to be readily accessible, of appropriate size for occupants, and in serviceable condition. Children under 12 and all non-swimmers are required to wear a PFD while in boats on RAFB waterways. Use of boats will be in strict accordance with Georgia state boating regulations.

**5.2. Hunting.** Hunting regulations for RAFB are the same as those established by DNR, along with the following base-specific regulations.

5.2.1. **Small and Big Game.**

5.2.1.1. **Small Game**. Small game hunting on base is limited to squirrel hunting with 20/12 gauge shotguns with shot as authorized under state law. Small game hunting on off base property is restricted to rim-fire rifles and shotguns as authorized under current Georgia law.

5.2.1.2. **Big Game.** The weapons authorized for hunting deer and wild hogs on and off base property are 20 gauge shotguns or larger, muzzle-loading black powder rifles, and bows and arrows. No other weapons are authorized.

5.2.1.3. Deer and wild hogs are the only authorized big game that may be taken.

5.2.2. **Weapons.** Concealed weapons and handguns are not authorized; carry weapons openly. The transportation of a loaded firearm in or upon a motor vehicle, horse, or power-driven boat is prohibited. Do not carry muzzle-loading rifles with the source of ignition in place. Do not hunt from a vehicle, plane, or boat.

5.2.3. **Other restrictions and prohibitions.**

5.2.3.1. The A and B areas are limited to archery hunting. Long or compound bows authorized under Georgia State law may be used.

5.2.3.2. The C and D hunting areas are limited to muzzle-loading rifles of .44 caliber or larger, or to shotguns that are 20 gauge or larger with slugs. Buckshot is not allowed. Bows and arrows as specified by Georgia

State law are also authorized.

5.2.3.3. Deer taken on RAFB must be checked in at the Nature Center, building 1305, as soon as practical after killing. Leave a note if the office is closed.

5.2.3.4. The chains at the entrances to the hunting areas are locked to keep unauthorized individuals out. A key will be provided to the hunter to lock and unlock the chains when entering and departing the hunting areas.

5.2.3.5. Do not hunt within 150 yards of Hannah Road. Do not hunt within 50 yards of any other road. Hunting is not allowed on gas or power line clearings.

5.2.3.6. Pick up a map at the Nature Center. Do not overrun or bypass roadblocks, barriers, gates, chains, restricted areas, and warning signs for any reason without prior clearance. There are no authorized hunting areas north of the gas line which intersects Horse Creek. Do Not cross Sandy Run Creek. There are private hunting clubs both north of the gas line and south of Sandy Run Creek.

5.2.3.7. Do not use a trap, snare, net, pitfall, deadfall, baited hook, live decoy, salt lick, or any other luring device while hunting. Do not hunt over a baited area, and do not use lights to blind wildlife.

5.2.3.8. Do not hunt with dogs.

5.2.3.9. Do not drive nails or spikes into trees, or hunt from or construct permanent tree stands. Hunters may not put up their stands closer than 70 yards from another stand. Individuals must be in their stand by daylight. Individuals are also requested not to scout or walk around except between the hours of 1100-1500.

5.2.3.10. Scouting for game is authorized any day up to the start of hunting season. Weapon restrictions apply while scouting. Individuals must obtain a season permit before they are authorized to scout the areas.

5.2.3.11. All persons are responsible for their vehicles.

5.2.3.12. Hunters should police hunting area for litter before departing.

5.2.3.13. Motor vehicles are not authorized on other than designated roads.

5.2.3.14. Persons found under the influence of drugs or alcoholic beverages in the hunting areas will lose their hunting privileges.

5.2.3.15. Vehicles and effects are subject to being searched for illegal game and weapons. Persons who violate these provisions and procedures are subject to punishment under Article 92, Uniform Code of Military Justice, for military offenders, and in the Magistrate's Court for civilian offenders.

5.2.4. **Closure of Areas.** From time to time certain hunting areas will be closed due to training. This information will be posted at the Spalding Nature Center, the Equipment Rental, and at the entrances to these areas.

5.2.5. **Hunting on Leased Property.** Robins AFB has an agreement with the Bradley Plywood Company for the hunting and fishing rights to 2,500 acres. The success of this agreement depends on the sportsmen.

5.2.6. **Safety Concerns**.

5.2.6.1. All hunters must wear an outer garment showing at least 500 square inches of daylight fluorescent orange visible above the waist, and an orange head-covering during firearms season.

5.2.6.2. Hunters are encouraged to hunt in pairs and must carry a compass and flashlight. Snake boots, chaps, or some other type of anti-snakebite clothing is advised.

**5.3. Noncompliance.** The Outdoor Recreation Office will report violations to DNR at (912) 751-6415. In addition to prosecution for violation of applicable state and federal regulations, any personnel apprehended for violation of these regulations will be reported to the appropriate commander or supervisor. The privilege of fishing or hunting on RAFB may be suspended for a period of up to 6 months for the first offense. A second violation may result in permanent suspension of privileges, payment of fines, and possible prosecution.

JEAN R. HAGOOD
Director, Environmental Management

**NOTE: The Hunting and Fishing Areas Map and the Wetland Locations Map are located in Appendix A.**

See Figure A-15 For
Hunting and Fishing Areas Map

**See Figure A-9 For**
**Wetland Locations Map**

United States Department of Interior
Fish and Wildlife Service
Washington, DC 20240

September 14, 2000

**To:** Regional Directors
**From:** Director /s/ Jamie Rappaport Clark
**Subject:** Service Guidance on the Siting, Construction, Operation and Decommissioning of Communications Towers

Construction of communications towers (including radio, television, cellular, and microwave) in the United States has been growing at an exponential rate, increasing at an estimated 6 percent to 8 percent annually. According to the Federal Communication Commission's *2000 Antenna Structure Registry*, the number of lighted towers greater than 199 feet above ground level (AGL) currently number over 45,000 and the total number of towers over 74,000. Non-compliance with the registry program is estimated at 24 percent to 38 percent, bringing the total to 92,000 to 102,000. By 2003, all television stations must be digital, adding potentially 1,000 new towers exceeding 1,000 feet AGL.

The construction of new towers creates a potentially significant impact on migratory birds, especially some 350 species of night-migrating birds. Communications towers are estimated to kill 4-5 million birds per year, which violates the spirit and the intent of the Migratory Bird Treaty Act and the Code of Federal Regulations at Part 50 designed to implement the MBTA. Some of the species affected are also protected under the Endangered Species Act and Bald and Golden Eagle Act.

Service personnel may become involved in the review of proposed tower sitings and/or in the evaluation of tower impacts on migratory birds through National Environmental Policy Act review; specifically, Sections 1501.6, opportunity to be a cooperating agency, and 1503.4, duty to comment on federally-licensed activities for agencies with jurisdiction by law, in this case the MBTA, or because of special expertise. Also, the National Wildlife Refuge System Improvement Act requires that any activity on Refuge lands be determined as compatible with the Refuge system mission and the Refuge purpose(s). In addition, the Service is required by the ESA to assist other Federal agencies in ensuring that any action they authorize, implement, or fund will not jeopardize the continued existence of any Federally endangered or threatened species.

A Communication Tower Working Group composed of government agencies, industry, academic researchers and NGO's has been formed to develop and implement a research protocol to determine the best ways to construct and operate towers to prevent bird strikes. Until the research study is completed, or until research efforts uncover significant new mitigation measures, all Service personnel involved in the review of proposed tower sitings and/or the evaluation of the impacts of towers on migratory birds should use the attached interim guidelines when making recommendations to all companies, license applicants, or licensees proposing new tower sitings. These guidelines were developed by Service personnel from research conducted in several eastern, midwestern, and southern states, and have been refined through Regional review.

They are based on the best information available at this time, and are the most prudent and effective measures for avoiding bird strikes at towers. We believe that they will provide significant protection for migratory birds pending completion of the Working Group's recommendations. As new information becomes available, the guidelines will be updated accordingly.

Implementation of these guidelines by the communications industry is voluntary, and our recommendations must be balanced with Federal Aviation Administration requirements and local community concerns where necessary. Field offices have discretion in the use of these guidelines on a case by case basis, and may also have additional recommendations to add which are specific to their geographic area.

Also attached is a Tower Site Evaluation Form which may prove useful in evaluating proposed towers and in streamlining the evaluation process. Copies may be provided to consultants or tower companies who regularly submit requests for consultation, as well as to those who submit individual requests that do not contain sufficient information to allow adequate evaluation. This form is for discretionary use, and may be modified as necessary.

The Migratory Bird Treaty Act (16 U.S.C. 703-712) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior. While the Act has no provision for allowing unauthorized take, it must be recognized that some birds may be killed at structures such as communications towers even if all reasonable measures to avoid it are implemented. The Service's Division of Law Enforcement carries out its mission to protect migratory birds not only through investigations and enforcement, but also through fostering relationships with individuals and industries that proactively seek to eliminate their impacts on migratory birds. While it is not possible under the Act to absolve individuals or companies from liability if they follow these recommended guidelines, the Division of Law Enforcement and Department of Justice have used enforcement and prosecutorial discretion in the past regarding individuals or companies who have made good faith efforts to avoid the take of migratory birds.

Please ensure that all field personnel involved in review of FCC licensed communications tower proposals receive copies of this memorandum. Questions regarding this issue should be directed to Dr. Benjamin Tuggle, Chief, Division of Habitat Conservation, at (703)358-2161, or Jon Andrew, Chief, Division of Migratory Bird Management, at (703)358-1714. These guidelines will be incorporated in a Director's Order and placed in the Fish and Wildlife Service Manual at a future date.

## Service Interim Guidelines For Recommendations On

## Communications Tower Siting, Construction, Operation, and Decommissioning

1. Any company/applicant/licensee proposing to construct a new communications tower should be strongly encouraged to collocate the communications equipment on an existing communication tower or other structure (*e.g.*, billboard, water tower, or building mount).

Depending on tower load factors, from 6 to 10 providers may collocate on an existing tower.

2. If collocation is not feasible and a new tower or towers are to be constructed, communications service providers should be strongly encouraged to construct towers no more than 199 feet above ground level (AGL), using construction techniques which do not require guy wires (*e.g.*, use a lattice structure, monopole, etc.). Such towers should be unlighted if Federal Aviation Administration regulations permit.

3. If constructing multiple towers, providers should consider the cumulative impacts of all of those towers to migratory birds and threatened and endangered species as well as the impacts of each individual tower.

4. If at all possible, new towers should be sited within existing "antenna farms" (clusters of towers). Towers should not be sited in or near wetlands, other known bird concentration areas (*e.g.*, state or Federal refuges, staging areas, rookeries), in known migratory or daily movement flyways, or in habitat of threatened or endangered species. Towers should not be sited in areas with a high incidence of fog, mist, and low ceilings.

5. If taller (>199 feet AGL) towers requiring lights for aviation safety must be constructed, the minimum amount of pilot warning and obstruction avoidance lighting required by the FAA should be used. Unless otherwise required by the FAA, only white (preferable) or red strobe lights should be used at night, and these should be the minimum number, minimum intensity, and minimum number of flashes per minute (longest duration between flashes) allowable by the FAA. The use of solid red or pulsating red warning lights at night should be avoided. Current research indicates that solid or pulsating (beacon) red lights attract night-migrating birds at a much higher rate than white strobe lights. Red strobe lights have not yet been studied.

6. Tower designs using guy wires for support which are proposed to be located in known raptor or waterbird concentration areas or daily movement routes, or in major diurnal migratory bird movement routes or stopover sites, should have daytime visual markers on the wires to prevent collisions by these diurnally moving species. (For guidance on markers, see *Avian Power Line Interaction Committee (APLIC). 1994. Mitigating Bird Collisions with Power Lines: The State of the Art in 1994. Edison Electric Institute, Washington, D.C., 78 pp,* and *Avian Power Line Interaction Committee (APLIC). 1996. Suggested Practices for Raptor Protection on Power Lines. Edison Electric Institute/Raptor Research Foundation, Washington, D.C., 128 pp.* Copies can be obtained via the Internet at http://www.eei.org/resources/pubcat/enviro/, or by calling 1-800/334-5453).

7. Towers and appendant facilities should be sited, designed and constructed so as to avoid or minimize habitat loss within and adjacent to the tower "footprint". However, a larger tower footprint is preferable to the use of guy wires in construction. Road access and fencing should be minimized to reduce or prevent habitat fragmentation and disturbance, and to reduce above ground obstacles to birds in flight.

8. If significant numbers of breeding, feeding, or roosting birds are known to habitually use the proposed tower construction area, relocation to an alternate site should be recommended. If this is not an option, seasonal restrictions on construction may be advisable in order to avoid disturbance during periods of high bird activity.

9. In order to reduce the number of towers needed in the future, providers should be encouraged to design new towers structurally and electrically to accommodate the applicant/licensee's antennas and comparable antennas for at least two additional users (minimum of three users for each tower structure), unless this design would require the addition of lights or guy wires to an otherwise unlighted and/or unguyed tower.

10. Security lighting for on-ground facilities and equipment should be down-shielded to keep light within the boundaries of the site.

11. If a tower is constructed or proposed for construction, Service personnel or researchers from the Communication Tower Working Group should be allowed access to the site to evaluate bird use, conduct dead-bird searches, to place net catchments below the towers but above the ground, and to place radar, Global Positioning System, infrared, thermal imagery, and acoustical monitoring equipment as necessary to assess and verify bird movements and to gain information on the impacts of various tower sizes, configurations, and lighting systems.

12. Towers no longer in use or determined to be obsolete should be removed within 12 months of cessation of use.

In order to obtain information on the extent to which these guidelines are being implemented, and to identify any recurring problems with their implementation which may necessitate modifications, letters provided in response to requests for evaluation of proposed towers should contain the following request:

> "In order to obtain information on the usefulness of these guidelines in preventing bird strikes, and to identify any recurring problems with their implementation which may necessitate modifications, please advise us of the final location and specifications of the proposed tower, and which of the measures recommended for the protection of migratory birds were implemented. If any of the recommended measures can not be implemented, please explain why they were not feasible."